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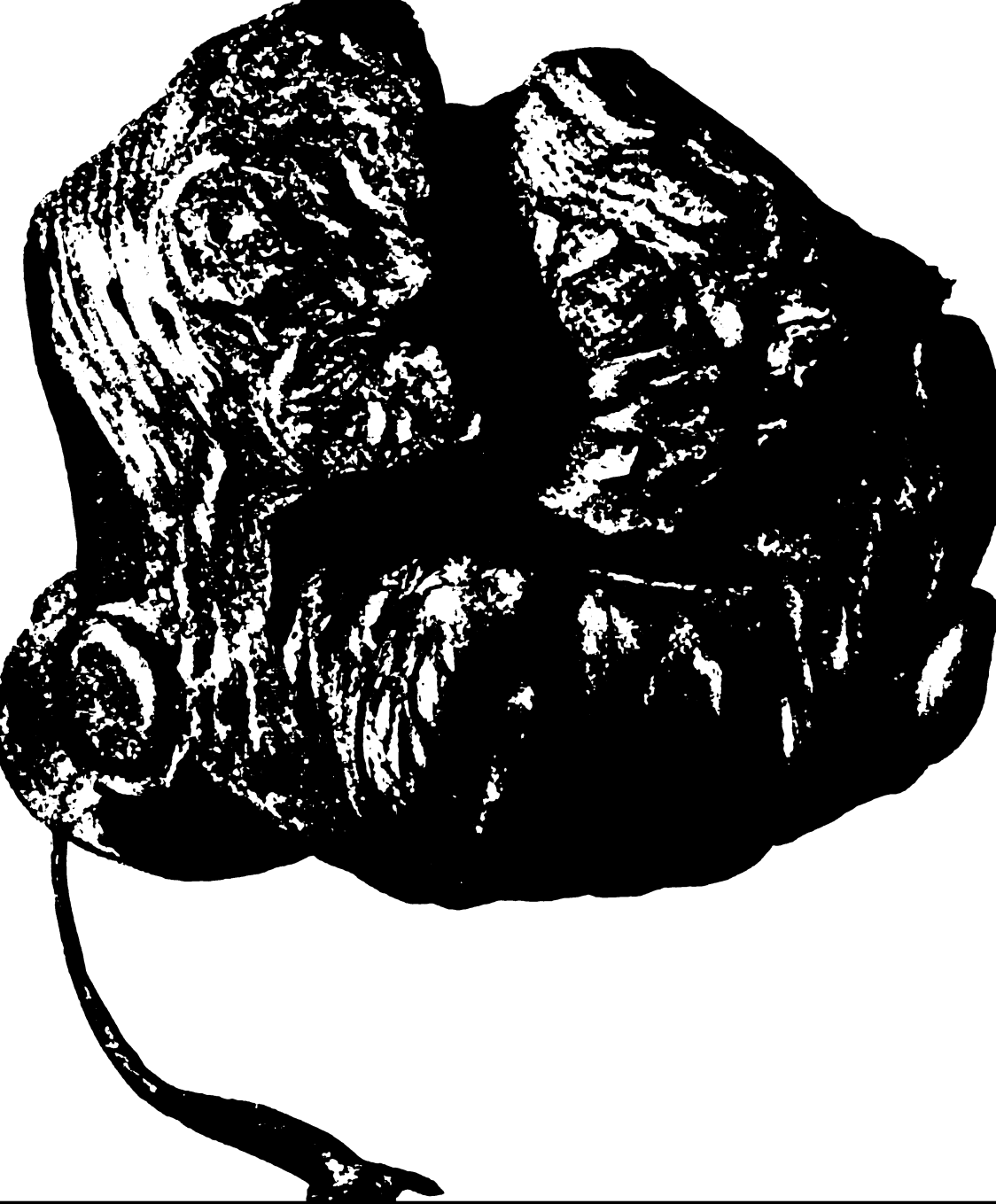
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Uterine fibromyomata

Edward Stanmore Bishop

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21. 2. 77



UTERINE FIBROMYOMA.

Hard encapsuled variety in anterior upper wall; soft encapsuled, in posterior wall. The transverse opening between is the widely dilated uterine canal. A. G., æt. 44. Periods every three weeks, with great and increasing loss. Tumor first noticed twelve months. Dysuria three months. Removed Sept. 7, 1897.

UTERINE FIBROMYOMATA

THEIR PATHOLOGY, DIAGNOSIS,
AND TREATMENT

BY

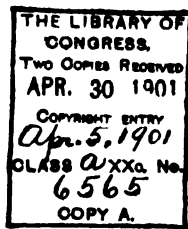
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With 49 Illustrations



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PREFACE.

In every department of surgery great progress has been made since the introduction of aseptic methods. It has become possible with more and more safety to interfere effectually with pathological conditions which previously were considered out of the reach of anything but medical treatment.

In a transition period many things are attempted which later require modification, which are capable of improvement, or which are relegated to oblivion; and only when sufficient evidence and experience has accumulated, and can be compared, is it possible to crystallize out a definite system of procedure. Such a transition period has lately been passed through in abdominal surgery, and very markedly in the question of the treatment of uterine fibromata.

The literature of this subject is so voluminous, and at the same time so scattered amongst medical journals of all kinds, and in all countries, that it is difficult for those who cannot spare the time or pains necessary, to obtain a comprehensive view of the subject.

In endeavouring to supply such a view, I have aimed chiefly at producing a practical work, and therefore the chapters on Anatomy, Development, and Secondary Changes do not profess to be exhaustive, but simply to contain what is necessary for clear ideas.

The chapter on the technique of various surgical methods I have endeavoured to make as complete as possible, giving, as far as can be done, the original directions of each operator.

As a conclusion, I have added a chapter on Final Results, which I hope may supply some information not very readily obtained, but which is, I conceive, of very great importance to those whose duty it is to advise patients suffering from these tumors as to their future course.

I am deeply indebted for important assistance to Dr. H. Macnaughton Jones, who has kindly allowed me to see the advance proof-sheets of the latest edition of his well-known work, and has also furnished me with some illustrations; to Dr. Howard Kelly and his publishers for the use they have permitted of some of the illustrations in his "Operative Gynæcology"; to Professors Baldy, Penrose, and Gardner, of America, to Messrs. Rutherford Morison, Christopher Martin, Alban Doran, and Bowremann Jessett, to Drs. Scharlieb, Cullingworth, Donald, Heywood Smith, and others, without whose help it would have been impossible to speak with any certainty as to the final results of operative work, to Professor Stewart, of the Hunterian Museum, Dr. W. J. A. Griffith, of St. Bartholomew's Hospital, Dr. H. Morley Fletcher, of St. Bartholomew's Hospital Museum, who have furnished me with photographs of museum specimens, and to Miss Louise Bradbury, whose clever drawings illustrate this work.

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UTERINE FIBROMYOMATA.

CHAPTER I.

INTRODUCTION.

DEFINITION AND SHORT DESCRIPTION.

Fibromyoma—to which the synonyms leiomyoma, fibroma, myoma, fibroid, recurrent fibroid, hysteroma (Broca), grossesse fibreuse (Guyon), myoma lævicellulare, fibrous tumor, are also applied—is a benign tumor, originating and developing in the uterine muscular wall or in some of its outlying processes, and composed of muscular and fibrous tissue in varying proportions.

Such a tumor may remain in its original position, or may be forced by the contraction of the surrounding uterine fibres into closer relation either with the mucous membrane internally, or the peritoneum externally—in which case, it may become at last entirely extruded from the grasp of the uterine muscle, and be covered simply by one or the other membrane, remaining, however, connected by its nutritive vessels at one point. It usually carries with it some fibres of the muscular coat, which form a thin capsule. Should this extrusion happen, the weight of the tumor itself will cause its outer covering to elongate, and to form a pedicle containing these vessels. The pedicle may become gradually thinned out and yield, and the tumor become absolutely free. If this should occur on the peritoneal side, the tumor will probably become adherent to other structures during the process, and obtain fresh nutrition from new capillaries formed in such adhe-

sions (Huguier ¹); in rare instances, it may remain free (Depaul ²). If on the mucous side, such yielding of the pedicle will result in expulsion of the tumor *per vias naturales*, after dilatation of the os and cervix, accompanied by severe labor-like pains, and probably septic necrosis of the mass itself. Lastly, the pedicle may become twisted, and apoplexy of the tumor result.

Classification.—Fibromyomata are seen under two main forms—*multiple* and *encapsuled* (Fig. 1); or *soft, single*, and *unencapsuled* (Fig. 4). Gusserow ³ first suggested this division, the importance of which was emphasized by Tait on operative grounds. The multiple tumors mainly begin in the body of the uterus; the single, in the cervix. This, however, though usually the case, must not be taken as an absolute rule, so far, at least, as position is concerned. Occasionally a *single*, hard, encapsuled tumor may be found springing from the body or fundus of the uterus, such as is shown in figure 2. *Multiple*, hard, encapsuled tumors have been described as springing from the cervix; and the frontispiece shows a hard encapsuled growth occupying one uterine wall, whilst a soft unencapsuled tumor has developed in the other. Both forms are composed of varying relative amounts of fibrous and muscular tissue, and are subject to various pathological processes, to be described later. (See Chap. V.)

Various other classifications are given by different writers, the most frequent being one depending on the actual *position* of the growth at the time of examination. According to this, fibromyomata are :

SUBPERITONEAL	{ Pedunculate.
	{ Sessile.
INTERSTITIAL	
SUBMUCOUS	{ Pedunculate.
	{ Sessile.
FIBROMYOMATA OF ROUND LIGAMENT.	
FIBROMYOMATA OF CERVIX	{ Fibromyomata of broad ligament.
	{ Fibromyomata of external os.

¹ Gaz. d'Hôp., Paris, 1860, p. 41.

² Bull. Soc. Anat. de Paris, 19, p. 15.

³ Die Neubildungen d. Uter., 1886, p. 56.

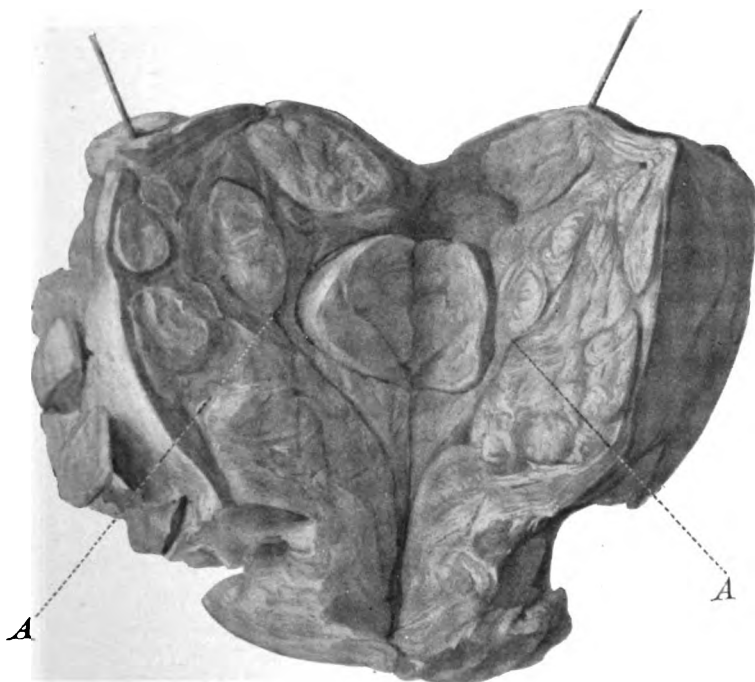


FIG. 1.—MULTIPLE ENCAPSULED FIBROMYOMATA. (EARLY STAGE.)
A points to projection of tumor from the general surface after section, owing to tension upon the muscular fibres around. The absence of connexion between the tumor and its capsule is also shown. (From the Owen's College Museum. Longest dimension, $4\frac{1}{4}$ inches.)

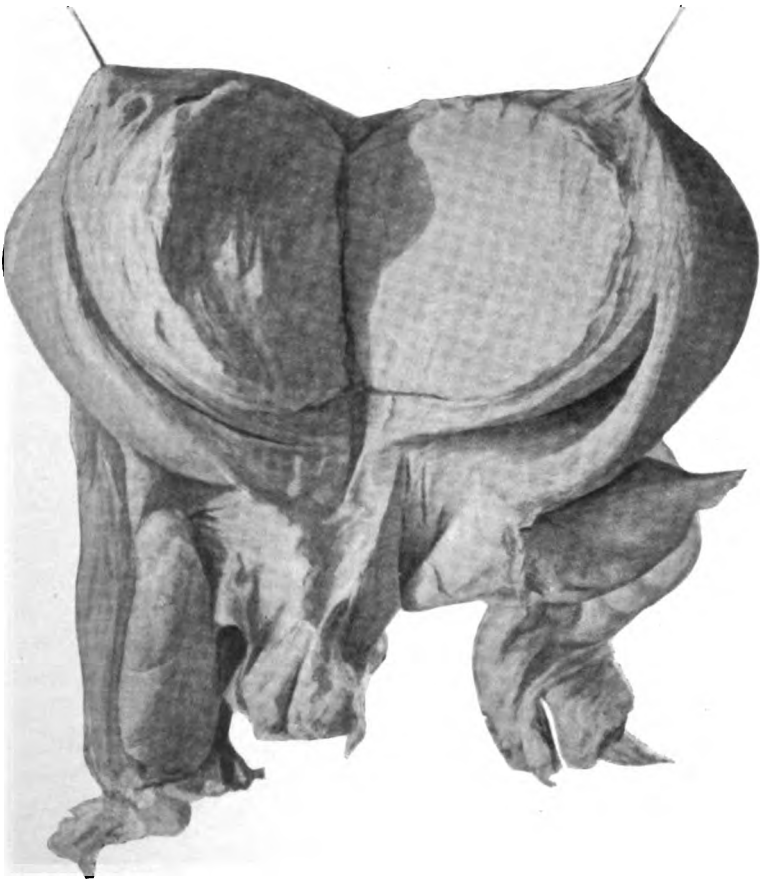


FIG. 2.—SINGLE, HARD, ENCAPSULED FIBROMYOMA.
(From the Owen's College Museum. Width across, 5 inches.)

This is an extremely useful classification, as the symptoms differ greatly according to the position of the growth ; but it is, I think, of secondary importance, for practical purposes, to the first. These tumors have also been classified according to the pathological processes of which they may become the seat. Thus, starting from simple fibromyoma, we have :

	Edematous.
By some authors :	Colloid or myxomatous.
	Fibrocystic.
	Calcified.
	Necrobiotic.
	Necrotic.
By some authors :	Sarcomatous. (See Chap. on Development.)
	Adenomyomatous.
	Telangiectatic.
	Lymphangiectatic.

The two varieties marked "by some authors" are doubtful. It is questionable whether a sarcomatous tumor ever really begins as a fibromyoma. The reasons against such a view are given in detail in a later chapter ; but at present it seems impossible absolutely to deny it, since Virchow has described several cases in which he considers that transformation of myofibromatous tissue into that of sarcoma has taken place, and numerous cases are on record of tumors which, after remaining quiescent for many years, have taken on rapid enlargement, and, when removed, have proved to be sarcomatous. But for further consideration of these cases, as also of myxomatous tumors, the reader is referred to chapter V.

The hard, encapsuled form is composed mainly of fibrous tissue, arranged in whorls, which intersect or blend with each other. (Fig. 1.) Such tumors contain few blood-vessels in their interior, but large vessels, especially veins, are often found in and just outside of their capsules. To this capsule the growth is attached by fine fibrous bands, which bands are usually very easily broken through, so that when once the capsule has been divided, the mass easily shells out, except at one point, that at which its main vessels enter. When the capsule is empty, there is rarely any bleeding from these connections. Such tumors grow slowly. The so-called

capsule is formed merely of the compressed, flattened-out tissue around, and therefore whilst but slightly connected with the mass within, it is in intimate relation to and direct continuation with the uterine muscle and intermuscular connective tissue without.

The soft unencapsuled form contains a much larger proportion of smooth muscular fibre, and is much more vascular. Its boundaries are not clearly marked, and there is no actual capsule. The connective tissue splits the muscular bundles into distinct groups,

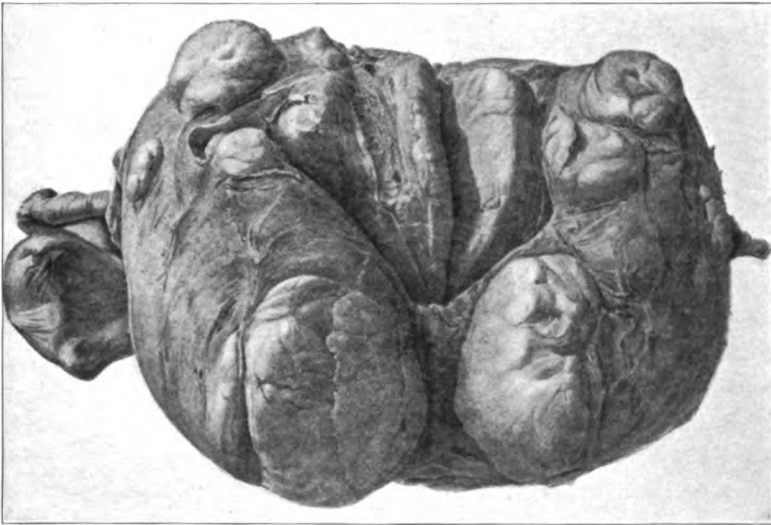


FIG. 3.—MULTIPLE ENCAPSULED FIBROMYOMATA. (LATER STAGE.)

On the left side is an ovarian hæmatoma, the Fallopian tube lying above it. (Width across, 9 inches.)

carrying blood-vessels into its interior. These tumors grow much more rapidly. (Fig. 4.)

Nothing is at present known as to the ultimate causation of fibromyoma, therefore it is impossible to say definitely why, in certain cases, multiple encapsuled tumors occur; in others, single unencapsuled growths. But it may be suggested that there can be little doubt but that such tumor formation is essentially dependent on some error in nutrition. Now, multiple encapsuled

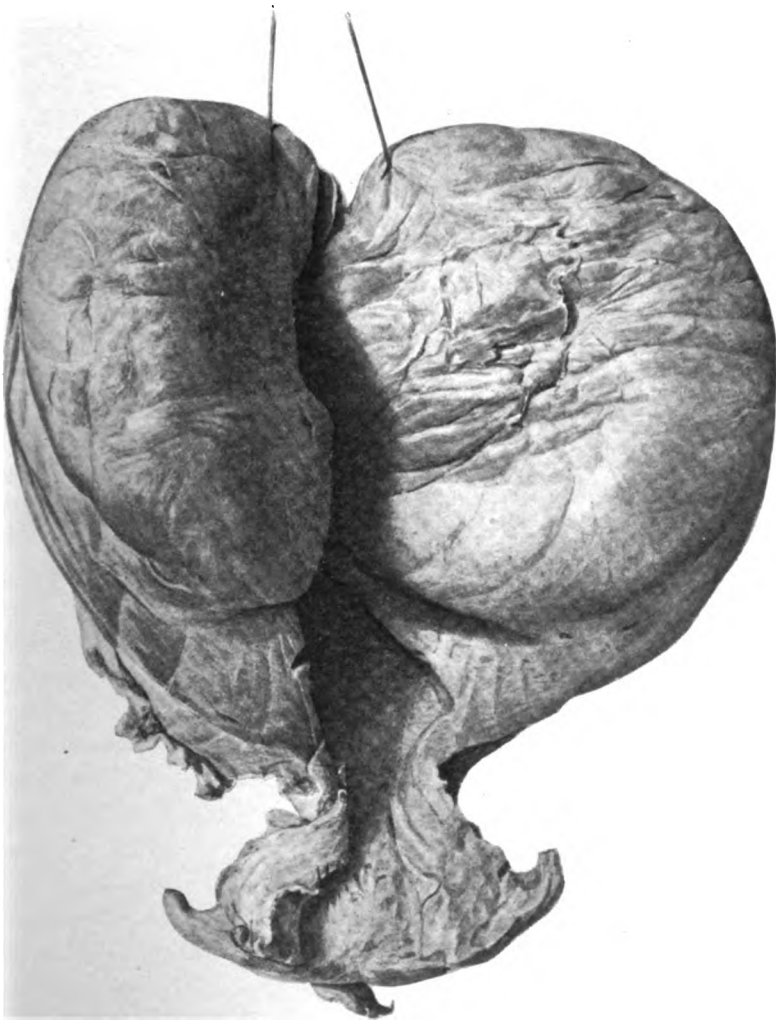


FIG. 4.—SINGLE SOFT FIBROMYOMA.
(Width across, $6\frac{1}{2}$ inches.)

tumors occur most frequently in the fundus and body of the uterus ; single unencapsuled, in the cervix and lower segment of the body. There is a distinct difference in the way in which these two portions of the uterus are supplied by blood. In chapter II this is referred to in detail. Here it may simply be said that blood is sent in a far more direct line to the lower segment than to the upper, the vessels supplying the upper coming off from the main trunk—a very tortuous one—almost at right angles ; whilst the lower vessels pass in almost a direct line from the parent trunk, and are, moreover, larger. (See Fig. 10.) Vascular supply, therefore, will be greater and freer to the tumors formed in the lower segment, fibrous degeneration of the muscular elements less likely to occur, and the results of such fibrous formation,—its contraction, the development of a capsule, which has but slight vascular connection with the growth itself, the almost non-vascular hard condition of the growth and its comparatively small size,—all of which are present in the multiple growths of the upper segment, are less likely to be observed in the tumors of the lower.

That free supply of blood has a favourable effect upon the development of these tumors is evident from their rapid increase during pregnancy and their corresponding decrease during involution of the uterus, when the blood supply becomes greatly lessened. If, therefore, all fibromyomata develop more rapidly when amply supplied, it is justifiable to consider that they will develop in a corresponding ratio according to the relative amount and freedom of that supply when the whole quantity is at a normal level.

According to Bayle, 20 per cent. of all women after twenty-five years suffer from fibromyomata ; according to Klob, 40 per cent. of all women over fifty years of age.

There is nothing necessarily in the family history or in the patient's own history to suggest any particular constitutional disease.

The patient may be married or single. There is a preponderance of unmarried, or at least sterile, women over those who are fertile.

The menstrual periods may have been entirely normal and painless at first, or there may have been dysmenorrhœa or amenorrhœa in early sexual life.

Course of Events.—The *first sign* is usually an increased loss of blood at the regular menstrual periods, which are somewhat lengthened in duration. This depends greatly upon the position of the growth. It is true if the tumor is interstitial, and still more if submucous. Subperitoneal and broad ligament growths may exist, and even reach a large size, without producing any great increase in the loss of blood. Indeed, such losses appear to depend mainly upon an irritative hypertrophy of the endometrium covering or opposed to the tumor rather than directly upon the presence of the growth itself.

Or, the attention of the patient may be first attracted by increased frequency in micturition, with or without some difficulty in the act. In such cases there is often found a tumor in the fundus uteri, or in the upper posterior wall, which, by its weight, has produced retroflexion. The cervix and anterior wall with its vesical attachment are dragged upwards, and tension upon the trigone of the bladder is produced, whilst the vesical opening of the urethra is narrowed and displaced. The same initial symptom is seen in broad ligament tumors, which equally displace the bladder, though in a more direct manner.

Lastly, the first thing noticed may be a gradual enlargement of the hypogastrium, which is more or less irregular in shape, and usually hard.

Should menorrhagia be the prominent feature, in the course of several months the hæmorrhages, steadily increasing in amount, will become irregular, no longer appearing at stated times. Bleeding may come on slightly or severely at any time during the normal interval. At first, the natural powers react between the losses, and the patient may appear but little the worse. Gradually, however, the loss is not perfectly made up; the bodily strength begins to flag. After matters have progressed in this way for some eighteen months to two years, the physical condition presents a very different aspect. The lips are whiter

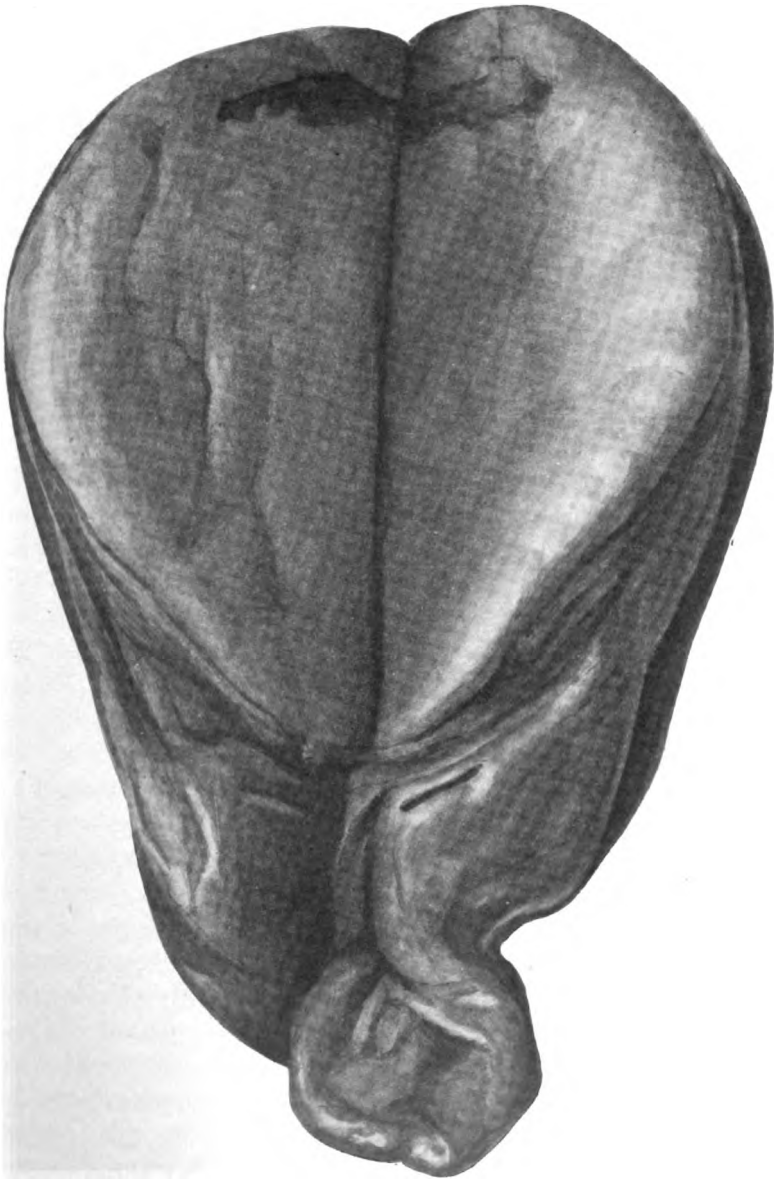


FIG. 4 A.—SINGLE SOFT FIBROMYOMA WITH NECROTIC CAVITY AT FUNDUS.

than natural, dark circles appear around the eyes, the cheeks are thinner, the whole body has lost and is still losing weight. There is not, however, the marked difference which exists in ovarian disease between the size of the abdomen and the wasted condition of the thorax and limbs. Slight exertion produces breathlessness; the patient readily faints, or preserves consciousness only by a painful effort; household duties become heavy burdens. If the growth, as is most frequently the case, distorts the uterine canal, the period becomes painful as well as excessive. The patient is forced to retire to bed at these times, and comes at last to spend most of her time recumbent. From time to time the loss is serious and almost uncontrollable, attacking her without warning, so that the ordinary duties and pleasures of society become impossible. In church, in the theatre, in her own drawing-room, at her own dining-table, an attack may come on, causing great mental and physical distress to herself, infinite anxiety to her relations, and often grave danger. Death may occur from sheer loss of blood, but this is comparatively rare. It may, perhaps, more often occur from sepsis due to sloughing of the tumor, or from some interference with the renal function. Brown atrophy of the cardiac muscle is not uncommon.

Albuminuria is said by Hubert ¹ to be produced by compression of the ureter.

Suppression of urine has been noted by Henry Morris ² and Popow.

Should the patient escape these dangers, she leads a life which is often little more than a vegetative existence. If the tumors are of the hard variety, the menopause is usually delayed and protracted. When it does occur, this variety of fibromyoma decreases in size, and may entirely disappear; but the patient is never quite as strong as other women of her own age. She is prematurely aged by the pain and depletion which she has undergone. On the other hand, should the tumor become fibrocystic,

¹ Tr. Obst. Soc. London, Vol. 39, p. 292.

² Morris, Huntern. Lectures on Renal Surgery.

œdematous, or be originally sarcomatous, the menopause brings no relief. Many such tumors appear to start into fresh life and development at this time. The prospect for such patients is gloomy in the extreme. If let alone, the mere bulk of the tumor displaces viscera, impedes their physiological action, and fatally depresses the patient's vitality. The elder Keith,¹ who probably saw as much of this class of patients as anyone, has left graphic accounts of the state to which they were reduced.

No. 7 of his cases will serve as well as any to demonstrate this :

"Mrs. W., æt. 40. Seen first in February, 1882; just recovering from an attack of hæmorrhage which nearly proved fatal. Plugging and treatment by ergot, both hypodermically and by suppositories, had, as usual, been tried without avail. Operation was deferred 5½ months. During the last 3½ months the tumor grew from half-way between the umbilicus and the ensiform cartilage until it pushed under the ribs and sternum, with a large projection on the right side, forcing outwards the loin and raising the ribs. Pain was severe on the right side, and tension was great. She was confined to bed, suffering greatly from facial neuralgia in addition to her other troubles. She had taken so much morphia at former periods that opiates scarcely afforded any relief. The abdominal wall was œdematous all over. There was some swelling of the labia and general œdema of the vagina and pelvis. At the operation, the incision measured 20 ins., and adhesions between the abdominal wall and the anterior surface of the tumor were so intimate that no line of demarcation could be made out. The tumor was cut into, and bleeding was free. Omentum was also adherent to both; all the tissues were œdematous. The transverse colon was firmly attached all along the upper margin, and in separating this the bowel was deprived of its omentum and partly of its mesentery. Much force was necessary to tear out the tumor. The omentum was so much lacerated that most of it was cut away. The peritoneum of the abdominal wall had been so adherent to the tumor that it was nearly all stripped off the wall, and in places the intestines were in contact with the muscles when the wall was closed."

During the comparatively short time she remained in hospital there was noted "more trouble from flatulence and distention, arising, doubtless, from the amount of intestinal adhesion to the wall."

Mortality of Unoperated Fibromyoma.—*The list of deaths recorded in the literature of the subject from fibromyomata which*

¹ Brit. Med. Journ., Lond., 1883, Vol. 1, p. 56.

have not been treated surgically is heavy, contrary to what appears to be the general impression. I have found the following :

Case by Finlay,¹ æt. 59, single, menopause 10 years before. Large tumor up to umbilicus. Death with symptoms of fever and peritonitis. Tumor the size of a foetal head attached to uterus by pedicle. Capsule had ruptured ; some extravasation of blood. At one point the small intestine had become attached, and the growth had formed a projection into the cavity of the gut. The fundus of the bladder had also been perforated by it. There were secondary deposits in the glands beneath the clavicle, in the heart, base of right lung, and left kidney.

Gervis² showed a large submucous fibroid, which had sloughed suddenly and completely, without any obvious cause or premonitory symptoms. There was also double pyosalpinx, and one tube had ruptured, causing fatal peritonitis.

Case reported by Dr. Lediard.³ Patient had large abdominal tumor, causing pain in back and free hæmorrhage, occasional attacks of sickness, and generally an elevated temperature ; after the last sounding of bladder and uterus for diagnostic purposes, she became worse, and died in 9 days, with symptoms of blood poisoning. P. M.—Miliary abscesses, of recent development, were found in both kidneys and infarcts in spleen.

Tait⁴ reports case, æt. 34. Patient died without an operation. P. M.—Uterus found as a black, sloughing mass.

Lediard.⁵ Fibrocystic myoma, reaching 2½ ins. above uterus. Diarrhœa, rise of temperature. After examination by sound, peritonitis, death on ninth day. Both ovaries partly cystic. Miliary abscess in kidneys. Spleen soft, enlarged, several recent infarcts. Liver fatty. Lungs œdematous, congested.

Edis⁶ reports a case, æt. 39. Suppression of catamenia for 2 months, 9 months ago, followed by flooding without warning, and profuse menstruation since. Soft and resilient tumor felt in posterior cul de sac. Rigor. Acute general peritonitis. Death. P. M.—General purulent peritonitis. Both Fallopian tubes thickened and distended. Both ovaries contained small abscesses. Tumor in Douglas' pouch was a soft fibroid in which were several small cysts.

Dr. Cotter⁷ showed a subperitoneal fibroid removed after death. Patient æt. 45. Diffuse suppurative peritonitis. Adherent intestine, with a quan-

¹ Brit. Med. Journ., London, 1883, Vol. 1, p. 459.

² Tr. Obst. Soc. London, 1883, July 4.

³ Brit. Med. Journ., London, 1883, Vol. 2, p. 941.

⁴ Brit. Med. Journ., London, 1883, Vol. 2, p. 1076.

⁵ Brit. Med. Journ., London, 1884, Vol. 2, p. 372.

⁶ Brit. Med. Journ., London, 1888, Vol. 2, p. 940.

⁷ Brit. Med. Journ., London, 1889, Vol. 1, p. 194.

tity of intensely foetid pus. Tumor in peritoneal cavity. Tumor and uterus weighed 5 lbs., attached by short, thick pedicle. Firmly bound down by adhesions on posterior surface.

Favell¹ reports a case where the patient died from sudden and profuse hæmorrhage.

Bigonin² showed a uterine fibroid, involving the entire uterus, cavity 4½ ins. Patient æt. 38. Had noticed tumor for 10 years. Two days before, struck her hypogastrium against a corner of the table. Admitted with symptoms suggesting internal strangulation. Violent pain followed blow immediately, and great faintness. Next day vomited. Abdomen greatly distended. No flatus or feces per rectum. T. 100°. Death. Abdomen full of blood, large sinus at back of tumor found ruptured, aperture blocked by clot.

Lee Dickenson.³ Case, æt. 48, single. Growth noticed 12 months, grew rapidly during last 27 days. Death from exhaustion due to discharge and pressure symptoms. Tumor in anterior wall of uterus. Externally, both macro- and microscopically it resembled a fibroid, but centrally it was soft and yellow. This softened portion had broken down into the cervical canal, and through the back of the uterus into the peritoneal cavity, forming a sprouting hæmorrhagic growth which filled the pelvis, and extended upwards into the left iliac fossa, surrounding and compressing the sigmoid flexure. The external part = ordinary muscle cells with fibrous tissue. Sprouting portion = short spindle cells with large nuclei; soft central part showed transitional cells.

Sheard⁴ reports calcified subperitoneal tumor found after death from apoplexy.

Gouget⁵ reports a case of fibroid of broad ligament where death was produced by uræmia. Hydronephrosis and atrophic interstitial nephritis of the right kidney; the pelvis had never been explored during the patient's lifetime.

Schletelig.⁶ Death without operation from general chronic peritonitis; pus found under an intestinal adhesion. Fibroma of the broad ligament.

Cullingworth.⁷ Widow, æt. 55, suffered for a long time with chronic constipation and occasional attacks of severe abdominal pain. Menopause had occurred at 53; admitted into St. Thomas' Hospital on October 8th, for intestinal obstruction. Moribund on admission, and died the same evening. At autopsy, the rectum found pressed upon, flattened, and obstructed by a myoma of the uterus. Tumor was adherent to the pelvic wall, and slightly to the

¹ Brit. Med. Journ., London, 1889, Vol. 2, p. 1139.

² Nouv. Arch. d'Obstet. et de Gynec., Ap., 1892.

³ Lancet, London, 1894, Vol. 1, p. 22.

⁴ Brit. Med. Journ., London, 1890, Vol. 1, p. 462.

⁵ Bull. Soc. Anat. de Paris, 1892, p. 222.

⁶ Arch. f. Gynak. u. Ged., Bd. 1, p. 425.

⁷ Tr. Obst. Soc. Lond., 1897, Vol. 39.

rectum. The entire colon was distended, the caecal wall had given way, and faeces had escaped into the abdominal cavity.

St. Thomas' Hospital reports, 1895, p. 412, woman admitted with large sloughing fibroid with septicæmia; died ten days after admission.

Tarnier reports 5 pregnant women suffering from fibroids who died before delivery.

Kelly¹ reports case of a woman, coloured, æt. 45. Myoma of uterus, with central necrosis, dilated ureters from pressure, pyelonephritis, emphysema of lung, general marasmus. Cardiac hypertrophy with hyaline, calcareous, and fatty degeneration. Death without operation.

Baldy mentions two deaths whilst undergoing treatment by ergot.

Thornley Stoker² mentions a case of a woman, æt. 34, who died in a sudden fit of syncope whilst waiting for operation.

Henry Morris³ reports a case causing intermittent retention of urine, and leading to double pyosalpinx and ovarian abscess on the left side, dilatation of ureters, acute double nephritis, purulent peritonitis, and death.

Dr. Lombe Atthill⁴ showed, at a meeting of the Pathological Society at Dublin, two large fibroids removed after death from a woman who died suddenly. Pus was found in the substance of the uterus, and she was proved to have died from septic embolic pneumonia.

Pathological Society Reports, 1897, p. 163; case reported of a woman, æt. 64. Tumor first noticed 30 years before; tumor removed after death.

Hogan reports a case of pregnancy in a fibroid uterus. Rupture at fourth month. Death.

A search amongst the various hospital museums in London gives the following result:

Royal College of Surgeons' Museum.—

No. 4639.—Woman, æt. 36. Twelve months before death noticed a hard lump in the right hypochondriac and lumbar regions. Owing to the length and flexibility of the pedicle, the tumor appeared during her lifetime to be quite free from the uterus. The catamenia were normal till four months before death, which took place twelve hours after giving birth to a four months' fœtus. The abortion was preceded by peritonitis and high temperature for several days. The tumor—a large one—was subperitoneal, springing from the back and left side of the fundus. Tumor measured 10 in. by 5 in. The pedicle was 4 inches long, 1½ in. broad, ½ in. thick.

No. 4642.—Two calcified uterine fibromyomata. One large kidney-shaped mass, 7 inches long by 3½ in. wide, composed of hard yellow earthy substance

¹ Kelly's Operative Gynecology, Vol. 2, p. 539.

² Brit. Med. Journ., London, 1881, Vol. 1, p. 195.

³ Ibid., p. 793.

⁴ Brit. Med. Journ., London, 1881, Vol. 2, p. 1058.

deposited irregularly through a tough fibrous tissue; the external surface is minutely nodulated and rough. It is invested with a thin capsule of fibrocellular tissue, to which the adjacent abdominal organs are adherent. Several coils of intestine are attached, not by their free surfaces, but by their mesentery, and it would appear that any attempt to remove the tumor would have very injuriously interfered with the blood supply of these coils. The uterus was said to be ossified, probably because it had smaller tumors of the same kind in its walls. One such growth, closely attached to its wall, was connected by a strong band to the first tumor; a coil of intestine was acutely strangulated by this bend, and was the immediate cause of death.

St. George's Hospital Museum.—

No. 14 h.—Woman, *æt.* 47, admitted in a dying state, and expired a few days afterwards. She had suffered from symptoms of polypus uteri for 8 years. No means had been taken to remove the tumor. Other fibrous tumors were embedded in the uterine walls. The vagina was considerably dilated, its lining membrane inflamed, and covered with mucopurulent secretion. The lower and anterior surface of the tumor was much ulcerated. The tumor itself lay in the vagina, and was attached above to the internal wall of the uterus by a long pedicle. Both ovaries were healthy. (*Post Mortem Case Book*, 1848, p. 5.)

No. 14 r.—Case of death without operation from peritonitis resulting from an abscess between vagina and bladder. Woman, *æt.* 40. Two tumors, one size of tangerine in anterior wall, one size of cocoanut in posterior wall. The weight of the posterior tumor had caused introversion of uterus and the mass had pressed upon and caused serious obstruction of ureters. (*P. M and C. B.*, 1870, No. 342.) Body fairly nourished and in good condition.

Both pleuræ covered towards the bases with recent lymph and in the cavities was a considerable amount of fluid.

No false passage leading from the urethra could be discovered.

Pelves of kidneys and ureters were extremely dilated, surfaces granular, and cysts existed in the cortices. Capsules very adherent.

14 w.—Uterus greatly distended by fibromyomata, enlarged to size of seven months' pregnancy.

Jane S., *æt.* 35, died in Hospital July 23, 1862. For 6 years menstruation had been profuse and painful and for 3 years the abdomen had been increasing in size. Three weeks before death the patient was seized with severe burning pain in the sacral region, hips, and hypogastrium, and the discharge, which had been simply of mucus, became brown and offensive (for 6 months some little thick yellow discharge). A soft mass was now discharged from the vagina. On examination a firm fleshy mass was seen protruding from between the labia; this filled up the vagina and could be traced into the os, where many more were felt. These were apparently loose, and were removed by the hand. They were blackish and horribly offensive. The patient suffered

much from vomiting. Large masses of foul sloughing organised matter were occasionally discharged from the vagina, and the patient sank. P. M.—The abdominal cavity was found occupied by a large tumor, reaching from liver to pubes, which proved to be the uterus altered as described. There were some flakes of recent lymph in the peritoneal cavity. All the other organs were natural. (P. M. and C. B., 1862, p. 200.) Body corpulent, belly swollen, feet and ankles œdematous. Heart flabby, valves natural. Lungs healthy. Ovaries and tubes healthy. Spleen rather large; contained a small fibrinous block. Intestines and folds of peritoneum were glued together by flakes of recent lymph. Death.

St. Bartholomew's Hospital Museum.—

No. 1887.—Cavity of uterus greatly enlarged and filled with retained blood. Anterior portion of tumor solid; forms about two-thirds of whole mass. Left Fallopian tube much thickened and dilated in its outer part. This is 12 in. long and contains blood. Left ovary much elongated; contains a single cyst at its outer extremity. Anterior portion consists of large tumor, measuring 7 in. antero-posteriorly; is everywhere encapsuled by the wall of the uterus, except posteriorly, where the cavity of the tumor opens into the cavity of the uterus by an oval aperture, 5 in. vertical by $3\frac{1}{2}$ in. transverse diameter.

The wall of the uterus at this point is $2\frac{1}{2}$ in. thick below, $1\frac{1}{2}$ in. above. Immediately beneath the capsule is a layer of calcareous deposit. The whole of the central portion of the tumor has broken down, forming a large irregular cavity, filled with putty-like blood. Cause of hæmorrhage was not discovered. Death without operation.

2960 b.—Woman, æt. 34, admitted for difficulty in micturition and defæcation of 2 years' duration. A rounded mass felt in abdomen reaching to level of umbilicus and continuous with a hard, fixed, nodular tumor, which was discovered per vaginam to occupy the whole pelvic cavity and extend on to the perineum. Exploratory laparotomy. Patient died of peritonitis. P. M.—Tumor found in condition of suppuration.

Guy's Hospital Museum.—

2271. 90.—A large fibrous polypus distending the uterus. The tumor led to considerable hæmorrhage. It projected through the os uteri, and the extremity of it was ligatured. The hæmorrhage ceased, but the patient eventually sank.

2275. 80.—Æt. 44 in 1837, married, several children. Five years before was seized with severe hæmorrhage. This continued at intervals, when, in 1837, the attacks were more frequent. A large hæmorrhage at last proved fatal. There was no other disease in the body. (Guy's Hospital Reports. Vol. 3, p. 143.)

These are cases in which death has supervened as a direct consequence, but indirectly fibromyoma is responsible for many more.

Winckel's statistics go to show that in about 10 per cent. of all cases death ensues after a longer or shorter period. Senn¹ points out that "the profound anæmia which is such a common occurrence in submucous tumors is incompatible with the performance of important functions for any length of time, and, besides, a chronic progressive anæmia engenders fatal complications, such as thrombosis, embolism, and pulmonary œdema."

Kelly says: "Hyaline degeneration of the heart muscle and arterio-sclerosis are sometimes seen in old cases."

Hofmeier, in 1884, insisted on the frequency of cardiac disease in cases of abdominal tumor, especially with fibromata. He collected 18 cases in which sudden death occurred from heart failure—3 fatty and 15 brown atrophy.

But the dangers which are inherent in the growth of fibroids are hardly more important than those which render operation dangerous when at last it is undertaken—dangers not directly due to the operation itself, but imported into it by changes in the tumor itself or in the parts around by delay. The latter have their part also in the first category—they themselves sometimes produce a fatal result before any operation is done, but they also increase the immediate risks in any such operation.

In the first place, however, without any of the changes to be described, excessive previous losses of blood may so deplete the patient as to render her unable to bear the necessary traumatism involved in even a slight operation. This is illustrated by a specimen, No. 4632 in the Hunterian Museum, taken from a patient of Sir Spencer Wells. The woman was æt. 32. She had had profuse menorrhagia for several years, threatening her life. The patient died of shock four hours after a comparatively easy enucleation.

The changes referred to are of five kinds.

The first change is that of the formation of inflammatory adhesions. These are often complicated with, if not entirely due to,

¹ Senn, *Path. and Surg. Treatment of Tumors*, p. 495.

inflammation occurring in the Fallopian tubes and ovaries. These complicate operations in three ways: First, they greatly lengthen the time required for the safe enucleation of the tumor or uterus; secondly, by their contraction they alter the normal relation of parts, rendering possible, even probable, the laceration or wounding of the gut or ureter, and anyone who has had, as a sequel to a tedious hysterectomy, to suture either the one or the other knows how immensely the chances of such a patient have been decreased, both by the time during which the abdomen must remain open and by the additional traumatism, to say nothing of the prospect in after years, should the patient survive, of possible stricture of one or the other tube; thirdly, there is the risk of leakage of some infective material during the process of removal. A very good idea of the formidable problem presented to the surgeon in cases complicated by pelvic peritonitis with consequent adhesions may be obtained by a study of a preparation in St. Bartholomew's Hospital Museum, numbered 2951 A (Fig. 5), contributed by Dr. Griffith.

The second change often associated with the above is the necrosis or sloughing of the fibroid itself. In the Transactions of the Obstetrical Society, Vol. 32, p. 171, is an account by Mr. Bland Sutton of a case in which death resulted from peritonitis a few days after an operation for removal of a sloughing myoma. At the autopsy shreds of gangrenous tissue were found projecting from the abdominal ostia of the Fallopian tubes. The specimen, No. 4602 A, is to be found in the College of Surgeons' Museum. Mr. Rutherford Morison, in writing to me, mentions the case of a woman operated upon by him, in which "the tumor was gangrenous, and had caused peritonitis. The gangrene was not due to twist, as it had no pedicle, but appeared to be the result of some vascular change. A prominent London gynaecologist had seen the patient a year ago, and said her small fibroid would not trouble her." See also case reported by Dr. Potter in chapter on "Final Results." A case of my own, in which the patient, a woman of 65, suffering from sloughing myoma, narrowly escaped death, is mentioned later (p. 84).

In St. George's Hospital Museum, No. 16 L., is a uterus containing an ovum of 2 months' development compressed between two large fibroid tumors, developed in the substance of its wall: one, embedded in the anterior wall, is about the size of an orange; the other, in the posterior wall, is as large as a small melon.

Removed by Dr. Barnes, Jan. 7, 1877. Abdominal section upon a woman who had been suffering for 3 months from symptoms due to the posterior mass and its rapid growth. When removed, it had become infected and was in a gangrenous condition. General peritonitis had been set up. Temporary relief to pain, but death in 30 hours. (St. Geo. Hosp. Rep., Vol. 8, page 91.)

In St. Thomas' Hospital Museum, No. 2430, is a vertical section of uterus and vagina, together with a very large fibromyoma which has grown in the posterior wall of the cervix. The growth is ten inches in its chief or vertical diameter and completely fills the vagina, correspondingly dilated by it. The tumor weighed 8 lbs., though parts had been removed by operation. Its lower end projected through the vulva, and was ragged and sloughing. Death from septicæmia.

The third change is the production of pressure upon the ureters, with the resulting changes in the kidneys thus caused. A very instructive illustration of this is sent to me by Dr. Cullingworth.

E. M., aged 43, married, was admitted into St. Thomas' Hospital, May 5, 1894. She was too ill to be submitted to much questioning, but the following particulars were obtained: She had been married twice and had had two children by her first husband, both of them more than 20 years ago. She had had no miscarriages. There had been no menstruation for 2 years. In other respects she had been apparently well until the 28th of April—*i. e.*, seven days before admission. She then had some difficulty in micturition, the urine passing in dribblets. On the 1st of May she was suddenly seized with severe pain in the left side of the abdomen. She went to bed, got up next day, but had to return to bed, and had been in bed up to the time of admission. On the day of admission she had sent for a doctor, who drew off the urine with a catheter and recommended her to come into hospital. She had taken very little food since May 1st, and had, indeed, only been able to retain milk.

Her tongue was dry, her lips were dry and brown, her pulse was quick and of high tension, respiration was rapid and shallow. There was some twitching of the fingers. The temperature was normal. Bronchial rales were audible over the chest. The urine was alkaline and offensive; it contained albumin, mucus, and a little pus.

The abdomen was slightly distended; there was increased resistance over the left half. On vaginal examination the cervix was found to be pushed forwards, and behind it there was a solid mass filling the pelvic cavity.

On May 6th an exploratory incision was made in the median line of the abdomen. In the pelvis was found a hard mass about the size of a cricket

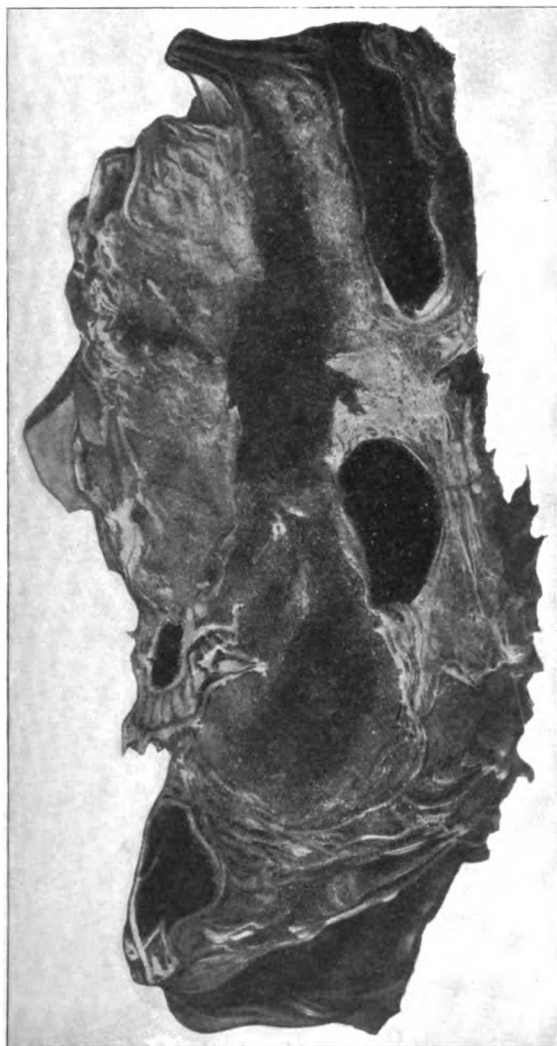


FIG. 5.—ANTERO-POSTERIOR SECTION OF THE SOFT PARTS OF A PELVIS, SHOWING THE RESULTS OF PELVIC PERITONITIS.
A large abscess cavity is roofed in by adherent omentum and intestine, which is firmly fixed by strong adhesions. (St. Bartholomew's Hospital Museum, No. 2951 a. Photograph. Actual Size.

ball, firmly and immovably attached to the cervix uteri behind and to the left. The bladder was seen to be distended. A catheter was passed and a pint of offensive urine was drawn off.

Owing to the position and fixity of the tumor and the bad general condition of the patient, nothing further was done. The abdominal wound was closed.

Patient was restless after the operation and next morning the breath was offensive and there were twitchings of the fingers. She died at 11.15 P. M. on May 7th.

P. M.—No peritonitis or effusion of blood into abdomen. Lower part of pelvis occupied by a nearly spherical fibroid tumor, which sprang from right side of the cervical portion of the uterus; this fitted tightly into the pelvis, so that it was difficult to insert the fingers behind and under it. It was, roughly, $3\frac{1}{2}$ inches in diameter.

Pelvic organs otherwise normal.

Bladder dilated, walls very thick, but the abnormal thickness was due to a deposit of fat, the muscular substance not being altered in amount.

Mucous membrane injected. It contained a little milky fluid.

When removed from body, no impediment was found to entrance of urine from ureters into bladder, such as had clearly been present during life.

Both ureters were uniformly dilated from end to end; their breadth, flattened and opened, $\frac{1}{2}$ inch.

They contained puriform fluid but no calculus. L. kidney: General dilatation of pelvis and calices,—evidence of interstitial change.

No suppurative change.

R. kidney: Larger than left, showed some moderate hydronephrosis with pyelitis, but the substance of kidney also showed radiating lines of suppurative inflammation and numerous abscesses.

Two phosphatic calculi lay in a smooth-walled chamber in the kidney substance.

Lungs oedematous.

Heart, liver, spleen, etc., *nil*.

The fourth change in many of these cases, apparently directly due to the persistent losses of blood, is the development of cardiac disease. Authorities have already been quoted for this statement. It is needless to point out how seriously such cardiac changes affect the chances of the patient during and after operation.

Fifthly, a broad ligament fibroid may grow in such a direction as to undermine, and spread out the meso-cæcum or meso-sigmoid. During its development the changes in position of the overlying gut are so gradual that no symptoms are apparent. Removal of the tumor, however, produces at once a sudden alteration, and

occlusion or gangrene of the intestine may result. Cases in which this has occurred with fatal results are recorded by Gouilloud,¹ of Lyons.

It is constantly affirmed that these tumors grow so slowly that many years must elapse before danger arises. This might be true if the danger were confined solely to pressure effects from actual size. Not entirely, however, since fibrocystic degeneration may very rapidly alter the mere size of the growth; Rutherford Morrison has given me particulars of a case of a woman fifty years old in which the abdomen was apparently filled with degenerated fibrocystic growth within six weeks; but, as I have shown, this is by no means the only, or, indeed, the chief risk. A few days since I removed a uterus containing three fibroids the size of apples, besides numerous smaller nodules. In two of these necrotic changes had gone so far as to produce small cavities, the size of large walnuts, containing pus, whilst the left ovary was a bag of pus, firmly adherent to the broad ligament. The symptoms in this case had only existed, so far as the patient knew, for twelve months (Fig. 16). The tumor represented in figure 3 had only been recognised four months before operation.

Hermann and Treves have described a case in which such a necrotic focus formed in a fibroid, and discharged itself into the uterine canal, so that, on dilating the os, the finger passed into the cavity. Symptoms of disease had existed here for only eight years. The specimen is preserved in the College of Surgeons' Museum, No. 4607 B., and is shown in figure 6.

Cullingworth² sends a list of 5 cases in which exploratory incision only was made, further interference not appearing advisable. Three of these cases were apparently begun with the intention of performing oophorectomy, but in one the appendages were not found; in another, they were found so bound down by adhesions as to be difficult to recognise; in a third, whilst the right appendages were under the abdominal wall, the left could neither be seen nor felt. In all these five cases the symptoms had apparently not

¹ Ann. de Gynéc., Par., 1899, p. 154.

² Private letter.

existed long; the longest time noted was two years, in one four or five months only had elapsed, whilst in a third, which was fatal, abdominal pain and difficulty in micturition had appeared suddenly only a week before admission.

In several of his cases treated by hysterectomy the same thing is to be noticed. Whilst some have suffered from ill health, menorrhagia, and other symptoms for years, others are noted as cases of rapid increase, or rapid development of pain and severe losses of

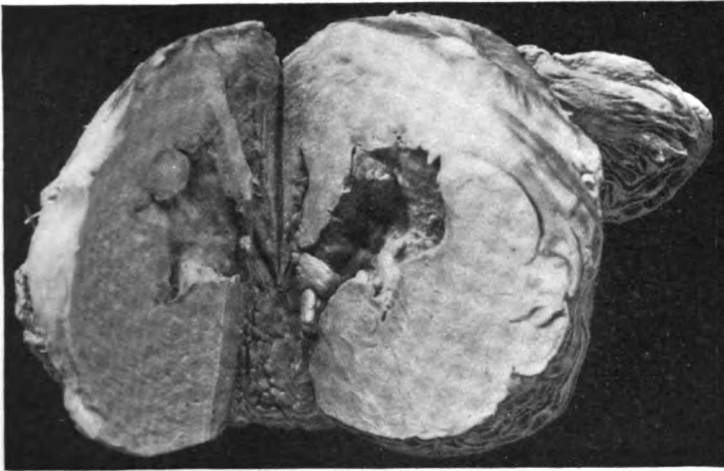


FIG. 6.—CENTRAL NECROSIS OF FIBROMYOMA.

The process is most advanced at a point nearest to, and opening into, the uterine canal. (Hunterian Museum, Roy. Coll. of Surg., No. 4607 B. Photograph. Across widest part, $4\frac{1}{2}$ inches.)

blood : One, No. 3, rapid growth ; tumor, 13 lbs. $3\frac{1}{2}$ oz. ; patient aged 43. No. 5, rapid increase. No. 6, rapid increase for 18 months (tumor gangrenous) ; patient aged 61. No. 11, rapid (gangrenous myoma with intestinal perforation) ; fatal. No. 18, sudden increase in rapidity of growth ; woman aged 45. No. 23, rapid growth since menopause, 6 months ago (fibrocystic tumor) ; fatal. No. 27, hæmorrhage and pain $2\frac{1}{2}$ years (tumor necrotic). No. 30, symptoms only 18 months (fatal). No. 54, symptoms for 15 months ; woman aged 51 ; fatal. No. 60, acute illness last 9

weeks. No. 65, ill for 11 months (tumor necrotic); fatal. The rapid increase after the menopause in Nos. 6, 18, 23, 54, and 63 is worth special consideration in this connection.

Inflammatory adhesions, pyosalpinx, ovarian abscess, sloughing of the tumor itself, etc., are of far more importance than any mere increase in size, and when they occur, not only do they greatly add to the ill health of the patient, but they immensely increase the difficulties of the surgeon and the risks of operation.

I have given these facts in some detail, because there is a tendency to treat fibroid disease as of slight importance. In literature this was more marked ten to fifteen years ago; thus, for instance, More Madden says¹: "These tumors, however much inconvenience or trouble they may occasion, very seldom indeed directly cause death. Their usual rate of development is extremely slow; their progress or increase, as well as their most urgent symptoms, in a large number of cases, being arrested by natural causes, or at the menopause. I cannot call to mind ever seeing any case in which death resulted directly from this disease."

Wallace said: "I have never known a case to succumb to hæmorrhage. It can always be checked." Modern writers admit more fully the gravity of the disease, but the results of previous teaching are difficult to remove, and, in practice, it is still the case that patients are advised to wait for the menopause, and are encouraged to struggle for long years with this hope in view.

It is well to present fully this, the other side of the picture. I have already referred to Keith's cases. Those interested cannot do better than refer to his original paper or to that of Schroeder.²

Fibroid tumors appear to have some tendency towards the production of *sterility*. This is not always the case, however, and should *pregnancy* occur, new and very serious complications arise. If the tumor is cervical, or so low as to become wedged in the pelvis during uterine development, it may prove an insurmountable barrier to the birth of the child. Operation without choice

¹ Brit. Med. Journ., London, 1887, Vol. 1, p. 52.

² Brit. Med. Journ., London, 1883, Vol. 2, p. 714.

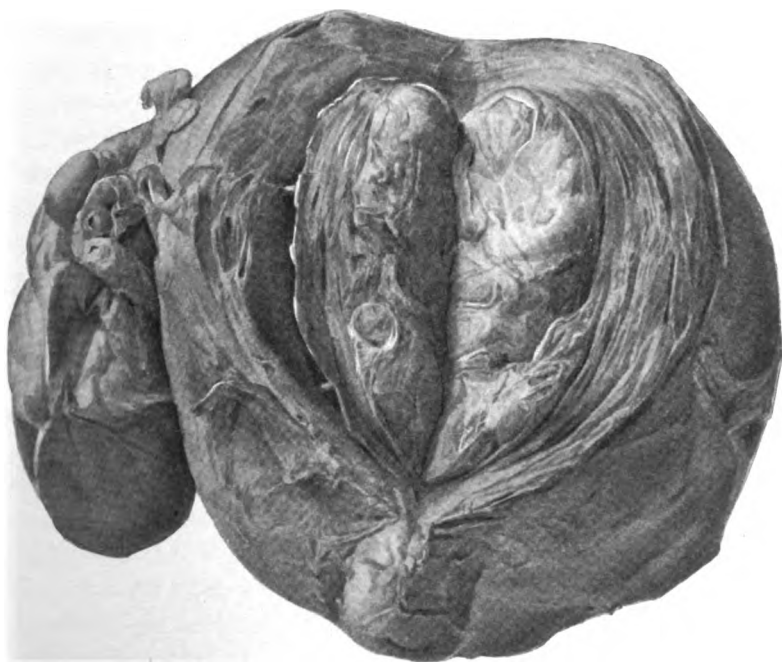


FIG. 7.—SUBMUCOUS HARD ENCAPSULED FIBROMYOMA.
On the left side is a tubo-ovarian abscess. (S. W., æt. 30. Repeated and profuse hæmorrhages. Great pain and complete invalidism. Removal Oct. 16, 1896.) (Across widest part, 6½ inches.)

of time may then be inevitable. If the tumor is supracervical, Kelly says two operations stand paramount—myomectomy and hysterectomy. Leopold's ¹ statistics for the former during the ten years between 1884 and 1894 give a mortality for the mother of 17.4 per cent. and 37.13 per cent. for the child. Staveland ² has a maternal mortality of 24.25 per cent. Olshausen ³ reports, in 21 myomectomies during pregnancy, 8 abortions or 38 per cent. Of 300 mothers delivered *per vias naturales*, Lefour ⁴ showed a maternal mortality of from 25 to 55 per cent., and an infantile of 77 per cent.

Parturition in cases of fibroid tumor is always a matter of difficulty, often of grave danger. Of 147 cases collected by Süsserott, ⁵ the forceps were required in 20, with a loss of 8 mothers and 13 children. In 21 cases the placenta required manual removal; and of these, 13 women died. Collectively, the maternal mortality was 53 per cent.; the infantile, 66 per cent. Tarnier, out of 6 cases delivered by forceps, lost 4 mothers and 4 children. Five women with fibroids died before delivery. Rosenwasser ⁶ says that careful antisepsis and improved technique have only reduced the mortality to 37 per cent. Some cases are not capable of delivery by the natural route. Sänger collected 43 cases where Cæsarian section became necessary; the maternal mortality was 83.7 per cent. Pozzi, 28 cases; maternal mortality 86 per cent. Cullingworth gives 2 cases of Cæsarian section, and one of Porro's operation, all fatal. ⁷ Johnston estimates that during pregnancy or labor one-third of the mothers and more than half of the children die; and recommends celibacy where the tumor cannot be removed.

McClintock ⁸ reports a case brought to the Rotunda, with a triple conception. On September 22, 1858, the mother was de-

¹ München. med. Wochenschr., No. 48, 1895.

² Am. Journ. Obst., 1894, No. 5.

³ Veit's Handbuch der Gynäk., Vol. 2, p. 800.

⁴ Brit. Gynæc. Journ., London, August, 1898.

⁵ Am. Journ. Obst., 1899, p. 609.

⁶ Diseases of Women, p. 116.

⁷ Progrès méd., 1887.

⁸ Private letter.

livered of a dead female child. At the hospital to which she was conveyed a second child was born alive, and a third was extracted. The mother died three hours after, of collapse.

If the pregnancy be brought to an end at an earlier period, with a view of permitting delivery in the natural way, the prognosis is not much improved. Lafour collected 39 cases of induced abortion with 14 deaths—a mortality of 36 per cent.

Amongst museum specimens illustrating this point are to be found :

Royal College of Surgeons, No. 4723.—

A young woman who died towards the end of pregnancy from profuse hæmorrhage. In the anterior lip of the cervix is a fibroid only one inch in diameter. Contributed by Dr. Goodhart, 1875.

St. Thomas' Hospital, No. 2436.—

Uterus at full period of gestation from a case in which Cæsarian section was performed, on account of the obstruction occasioned to parturition by fibromyomata. The uterus measures 5 in. in length, the incision 4 in. The os, cervix, and anterior wall are healthy. The lips of the incision gape widely. As on the patient's left there is a large tumor, the inner convexity of which comes well up to the edge of the wound, it would have been very difficult to secure this part of the wall safely. The fundus is occupied by another, and springing from the posterior portion of the cervix is a large, broadly pedunculated growth which must have occupied the pouch of Douglas and absolutely prevented delivery by the normal route. There is also a subperitoneal growth from near the right fundus. This is the case of a woman æt. 41. She survived the operation 36 hours.

In Guy's Hospital, No. 2268. 25.—

Case of a woman, æt. 34, married 12 years, never pregnant before. She was seen in the sixth month of gestation, when a large, hard tumor was found on the right side of the abdomen which had existed for many months, but had latterly grown very rapidly. At this time she was seized by labor pains, was delivered of twins, rapidly sank into a condition of collapse, and died. The uterus is dilated, its walls containing small fibroids, but the large tumor springs by a broad pedicle from the anterior surface of the fundus. One-third of this is disintegrating and broken down. Suppuration.

A patch of the still intact wall is worn very thin, and has in this patch an opening the size of a threepenny piece, which would open communication between the peritoneum and the cavity of disintegration.

2268. 75.—

Lady, aged 44, married 14 years, child 8 years since. Catamenia have been regular since. Four years ago had uterine hæmorrhage and a tumor formed in right groin. Two months since another tumor felt in left groin. In 2 months after examination was delivered; placenta was lying over os. Much hæmorrhage, which proved fatal. Both cases are contributed by Dr. Ashwell.

A ghastly description of an unfinished operation for fibroid disease, interference with which has been delayed too long, is given by Platonoff.¹

He reports a woman, æt. 45. Tumor growing for over ten years; at last prevented patient not only from work, but from walking. Patient pale and emaciated, face and feet œdematous. Respiration frequent, shallow, costal. Abdomen highly distended, 85 cm. from pubes to sternum, 165 cm. circumference at level of umbilicus. Tumor smooth, hard. Urgently requested operation. On laparotomy, half a pint of yellowish fluid escaped from abdominal cavity. The tumor was felt springing from uterus, adherent to bladder, larger curvature of stomach, ascending and descending colon. Adhesion so firm that operation was abandoned. The abdominal wall could not be closed, and was left open. Temperature rose. Two subsequent attempts were made to remove the tumor in pieces by cautery, but the hæmorrhage was too free. Gangrene set in in the wound, and spread inwards; patient died on the eighteenth day.

P. M.—Examination showed firm adhesion to bladder, pancreas, stomach, colon. The tumor was richly supplied with vessels, the largest being the thickness of the finger, and springing directly from a large aorta. The kidneys were wasted and œdematous, the ovaries small and atrophied. Tumor was an interstitial fibromyoma and weighed 41 kilograms.

Another case which illustrates the difficulties and risks of a delayed operation is one of my own.

Mrs. H., æt. 38, married 20 years, three children, eldest 17 and youngest 13 years. Menstruation commenced at 13, normal, and regular up to marriage. Admitted into Ancoats Hospital, April, 1893. Has noticed swelling of the abdomen for seven years. The enlargement has become much more rapid during the last six months. Has complained of intermittent pain ever since the enlargement began; this has been constant during the last six months. Abdomen is much distended by a hard smooth tumor, lying obliquely, with its rounded upper limit in right hypochondrium. In the middle line

¹ Khirourga, August, 1898.

and above is a small rounded mass, like an orange, closely attached to the main tumor. P. V., os drawn up out of reach. In the posterior wall of vagina, at its upper extremity, the lower portion of the tumor can be felt. The whole mass is slightly moveable laterally. The true pelvis is quite clear. Tumor is hard, smooth, firm. Circumference at U., 38 in.; from ensiform cartilage to pubis, 9 in.; right A. S. Sp. to U., $9\frac{1}{2}$ in.; left A. S. Sp. to U., 10 in. On laparotomy, base of tumor appeared to extend from one iliac crest to the other. Whole mass covered by large veins, size of little finger. Bleeding from accidental wound profuse; mass turned out and pedicle treated by wire *serre-nœud*, extra-peritoneally. (This case occurred before the practice of pan-hysterectomy.) Patient greatly collapsed, rallied under heat and stimulants, but died two days after, from exhaustion. Tumor weighed $16\frac{1}{2}$ lbs. Uterus was normal size, perched on one side of the tumor like a small excrescence. (Fig. 7.)

Such cases are practically analogues of the old ovarian tumor, which Tait and Spencer Wells describe, carefully let alone or treated by timid methods until their size and weight rendered existence with them unbearable, and at last, yielding to the desperate wishes of the patient, some more daring surgeon attempted their extirpation—with usually a fatal result. This result was put down to the credit of the operation, and acted still further as a deterrent from similar measures in other cases. With the knowledge now obtained we know that the result was by no means due to the operation, but to the delay, which devitalised the patient and permitted the tumor to assume such dangerous magnitude, together with the interference with normal functions produced by the pressure which it was able to exert upon surrounding tissues. Ovariectomy, now no longer delayed until the more serious complications arise, has become an extremely safe operation, and no gynecological surgeon would think twice as to advising removal whilst yet the tumor was small and the patient's functions unimpaired; knowing so well that every month's delay increased the difficulties of extirpation, and the risks which necessarily accompanied it. We are in the same position with reference to fibroid uteri, with two additional and very grave reasons for early interference. An ovarian tumor is not usually accompanied by any losses of vital fluid; it is only when pressure begins to interfere with function that such patients commence to emaciate. And most ovarian tumors, if one

excludes dermoids, are elastic and compressible, so that they accommodate themselves to some extent to their environment. But in fibroid disease neither of these compensating factors is present; from first to last, should the tumor be interstitial or submucous, there is a steady drain upon the most vital fluid of all. That women can and do lose blood physiologically to a certain extent, without harm, is no reason why that limit should be persistently and increasingly overstepped. Then, in ovarian disease the tumor is elastic, and accommodates itself to some extent to its surroundings. But this is not the case in fibroid disease. Here the tumor is hard and unyielding, except to bony pressure. It is the merest chance as to the direction in which it will develop and as to what organ will be exposed to its resistless growth. Hubert¹ points out that albuminuria in these cases is due to compression of the ureter, and is an additional reason for early removal; since, later, nephritis may be set up, which may become a formal contraindication for any operation. Doyen says the amount of the urine diminishes when there is mechanical compression of the ureters, but albuminuria, common in such cases, may exist when the tumor is perfectly moveable, even when it is pedunculated. In my own cases pain in the nerves of the lower extremities, from intra-pelvic compression, has been frequent. Dysuria, undue frequency, and occasional suppression of urine has been noted; and often dyspepsia, reflex vomiting, and other reflex disturbances of the digestive tract, due apparently to pressure upon the sympathetic system of nerves, are of constant or almost constant occurrence. It is curious how generally the rectum escapes, but defæcation itself has, in the majority of instances, to be assisted by drugs or enemata.

Leichtenstern,² quoting Warren, describes a case in which a pedunculated subperitoneal fibroid of the uterus was so wedged in, in consequence of a sudden change in position, between the wall of the pelvis and a false ligament stretched from the lowest part

¹ Thèse de Bourdeaux, 1898.

² Treves, *Intestinal Obstruction*, 1899, p. 78.

of the ileum to the uterus, that the bowel was bent and occluded by the traction of the band attached to it.

To sum up the natural progress of the disease, I cannot do better than use the words of Penrose¹: "In very exceptional cases, *so rare that they are to be looked upon as medical curiosities*, the fibroid disappears spontaneously. . . . We have no right in any case, however, to look for such favourable termination." "The dangerous forms of degeneration—the œdematous, the cystic, the teleangiectatic, and the sarcomatous—occur with sufficient frequency always to be dreaded; and even though these dangers be avoided, the anæmia from the continual hæmorrhage exposes the woman to fatal results from the diseases and accidents of daily life. The most favourable course is that it may grow slowly, produce symptoms not unendurable, and that at the menopause it may atrophy and disappear. This comparatively favourable course condemns the woman to a life of invalidism more or less marked during the years which should be the most useful and active of her existence. The menopause may be delayed five, ten, or fifteen years, or it may be indefinitely postponed, and even after the menopause has occurred, in a certain number of cases the fibroid continues to grow, and may ultimately cause death." Thus the prospect is vegetative existence or death, with occasional escape after the best years of life are over—the very reverse of the usual optimistic view taken by the majority of practitioners at present, who are inclined to regard the really exceptional cases as embodying the rule, and the usual result as the exception.

As Bland Sutton² says, "it is becoming a plain duty to point out to patients with uterine myomata, as we do when they have ovarian tumors, that the earlier the tumors are removed, the less the operative dangers, and, therefore, the more diminished the peril to life."

Complications.—One of the most frequent complications of fibromyoma uteri is *salpingitis*, with or without *ovaritis*, eventually

¹ Text-book on Dis. of Women, p. 241.

² Tr. Obst. Soc. London, Vol. 39, p. 292.

ending in *pyosalpinx* or *ovarian abscess*. When this occurs, it greatly increases pain, general ill health, and emaciation.

Bovée¹ reports a case of a woman, æt. 39. Severe pain and swelling of left leg, and tumor in abdomen. Admitted to hospital February 23, 1896. Tumor above umbilicus, adherent to abdominal wall and in pelvis. In upper part was a pus pocket containing about a pint of thick pus. Right appendage degenerated and adherent.

Rufus B. Hall² reports another. Patient æt. 36, married 15 years, sterile. Soon after marriage had acute abdominal inflammation and "womb disease" for 1-2 years. Afterwards the menses were prolonged and excessive, and she suffered from back-ache, leucorrhœa, and pain in the abdomen. Three years since abdominal inflammation set in, confining her to bed for some weeks. Since then she has never been entirely free from pain. In September, 1895, was very ill for some days with abdominal inflammation. Tumor discovered. Septic condition began, continuing with fluctuations until end of October. Uterus with small fibroid in anterior wall, and subperitoneal fibroid with pedicle attached to posterior part of fundus, wedged down in pelvic cavity, and adherent. Inspissated pus in right tube. Abscess in right ovary.

Dr. Mary D. Jones reports a case in which both tubes were greatly enlarged, the right filled with bloody fluid, the left with pus.

Twambly³ estimated that 50 per cent. of interstitial fibroids were complicated with affected tubes sooner or later in their course.

Meredith⁴ said that an analysis of Tait's cases showed 54 per cent. of tubal disease and 46 per cent. of chronic ovaritis.

All authors, indeed, report such cases. My own experience is that they occur with great frequency, if the tumor, as is usual,

¹ Am. Journ. Obst., N. Y., 1896, Vol. 2, p. 395.

² Am. Journ. Obst., N. Y., 1896, Vol. 1, p. 559.

³ Boston Med. and S. Journ., May 20, 1897.

⁴ Brit. Med. Journ., London, 1890, Vol. 1, p. 897.

has been growing for a few years. I have figured two with this complication. (Figs. 7 and 8.)

It has appeared to me to be more frequently seen when previous treatment of a so-called palliative kind, such as curettage, has been used.

Phlebitis is another complication of fair frequency. Thrombosis of the veins of the lower extremity which may or may not be septic. The operation of curetting is peculiarly liable to be followed by such a result. Small veins are opened, bacteria are introduced, and the process commences from this point. When removal of the appendages was the fashion, phlebitis following this operation was occasionally noted. Doyen¹ mentions such a case, and considers that infection was introduced here also from the uterine cavity. It is evident that after such an operation other avenues of infection were possible.

When a tumor becomes of large size, or, developing in such a way as to become impacted in the pelvis, comes to press upon the pelvic segment of the ureter, various other complications may occur. To these I have already referred.

Intestinal obstruction has been seen. This is not common, as the coils of intestine are usually evenly pushed out of the way, by the gradual encroachment of the tumor upon the abdominal space. It is more likely to occur when bands of adhesions have been formed around coincidently inflamed appendages, but it may result from development beneath the large intestine, opening out the meso-sigmoid or cæcum, and flattening out this gut over its surface; or, as in the case already mentioned (p. 47), by strangulation under bands formed between the tumors and others or surrounding structures.

Turning from complications, two very curious facts in the life history of fibromyomata are: First, that *occasionally they cease to grow, and remain stationary for months or years*; and, secondly, that sometimes, *without any appreciable cause, they decrease in size, and may even entirely disappear*. Alban Doran² collected 37 cases

¹ Ann. de Gynéc., Paris, Sept., 1899, Vol. 52, p. 198.

² Lancet, London, 1893, Vol. 2, p. 31.



FIG. 8.—FIBROMYOMA UTERI WITH PYOSALPINX ON THE RIGHT SIDE. A PROBE PASSES THROUGH THE UTERINE CANAL.

Mrs. R., æt. 30. Excessive menorrhagia for 14 years, several miscarriages, one attack of intestinal obstruction three years before operation. Removal, Sept. 21, 1898. (Across widest part of uterus, $4\frac{1}{4}$ inches.)

of disappearance, which were, however, not always complete, and mentions a case of his own, in which, after a heavy fall, which involved a severe blow upon the growth, the tumor disappeared. This case, however, seems to me open to objection, inasmuch as an injury occurred, and was followed three and one-half months after by a discharge of foetid fluid, thus suggesting necrosis, a different thing to the quiet absorption without apparent cause here referred to. Graily Hewitt, however, reports two undoubted cases, both patients under forty. Playfair reports several examples of spontaneous absorption and practical disappearance.

Operative interference, in itself abortive, has sometimes been followed by decrease in size; thus, Duncan¹ reported a case abandoned after exploratory abdominal section, owing to adhesions, which eighteen months after had entirely disappeared, and Mose-tig² reported a case with rapid shrinking of a large myofibroma down to the size of a fist after a similar exploratory incision.

A similar case is reported from St. Pancras' Infirmary. (See chapter on Final Results.)

Tait³ has noted great changes in bulk apart from treatment. One case with Dr. Priestley, watched for ten years, varied on four occasions during two years to the extent of 80 per cent. of its greatest bulk. He had seen large myomata diminish one-third of their bulk by keeping the patient in bed for a few weeks.

Such cases tend to throw considerable doubt upon the effects reported to have followed the use of certain drugs, or of electrical treatment.

On the other hand, sarcomatous tumors, or myofibromata which have undergone definite fibrocystic changes, have never been known to decrease in size. Their progress is always in the direction of steady enlargement. It is noteworthy that these are precisely the cases in which drugs and electrical treatment are admittedly useless.

¹ Tr. Obst. Soc. London, Vol. 10.

² Brit. Med. Journ., London, 1888, Vol. 2, p. 883.

³ Brit. Med. Journ., London, 1887, Vol. 2, p. 964.

The age of the patient when the tumor first appears is usually over twenty-five. Many fibromyomata, however, appear to commence much later. Some, indeed, appear to start originally into existence at or about the menopause, or else, although present long before, have remained quiescent until this period, when they begin to enlarge. On the other hand, they are not unknown before twenty-five; thus, Spencer¹ records two cases occurring in women aged respectively twenty-three and twenty-four, and refers to a case recorded by Bedford, reported in Nelson's Northern Lancet, N. Y., 1852-3, æt. 23; three by Leopold, æt. 24, 22, and 21; one by Fehling, æt. 21 (Archiv. f. Gynäk., vol. 13, p. 190-2; vol. 38, p. 54; and vol. 48, p. 109); one by Eck, æt. 19; one by Michel, æt. 21; one by Howitz, æt. 13; one by Wildt, æt. 23; one by Hagar, æt. 22; one by Karström, æt. 24; one by Bandl, æt. 22; one by Bukowski, æt. 18; one by Schmahl, æt. 21; one by Mundo, æt. 23; one by Chrobak, æt. 23; one by Brohl, æt. 18 (all from the Centralbl. für Gynäk., 1878-95); one by Jordan, æt. 24 (Zeitsch. f. Geb. u. Frauenkl.); four by Engelmann, æt. 22, 23½, 21, and 19 respectively, etc. In England, Playfair has recorded one, æt. 22; Boxall one, æt. 23 (Obstet. Trans., vol. X and XXXV); Mansell Moullin one, æt. 24; West one, æt. 24. In France, Tillaux one, æt. 19 (Annales de Gynéc., vol. 26). In all, 40 cases, and I have found, besides, a case of cystic tumor mentioned by Manoury² occurring in a girl of eighteen.

As to the opposite point, that of the *termination* of fibromyomata, we must differentiate. Hard, multiple growths frequently atrophy and disappear at or soon after the cessation of the menses. Tumors, however, which have undergone some degeneration do not cease to grow; such are the fibrocystic, the cedematous, or the sarcomatous. Those which have become calcareous remain the same size from the time that this form of degeneration begins.

Dührssen³ holds that retrogression is rare at the menopause; rapid growth and degeneration frequent.

¹ Tr. Obst. Soc. London, 1898, p. 228.

² Rep. Univ. d'Obstet. et de gynéc., Aug. 25, 1894.

³ Brit. Med. Journ., London, 1889, Vol. 2, p. 299.

Whether this be so or no, the occurrence of the menopause itself in such cases is very generally delayed. Edis ¹ says that waiting for the climacteric is a myth. He has seen cases still regular long after fifty years of age. Keith (the elder) said: "The three or four years before menstruation ceases are the most trying time for a patient with a bleeding fibroid, and the periods have a tendency to linger on year after year, till it is often long after fifty that, in the majority of cases, the troubles caused by a uterine tumor come to an end." Penrose says that in these cases the menopause is delayed five to fifteen years beyond the normal time. Amongst my own cases, I have met with one, in a woman aged sixty, who had apparently never ceased to be regular. Doyen ² says that he has seen metrorrhagia continue up to the age of sixty-five.

Subperitoneal pedunculated fibroids are not usually associated with hæmorrhage. They are, however, more painful than those not so intimately connected with the peritoneum. From the fact of their mobility, they may produce colicky sensations, and temporary obstruction, in consequence of their pressure upon coils of intestine. They are peculiarly liable to impaction in Douglas' space, when they simulate retroflexion. From this, however, they are to be distinguished by bimanual examination, or by the passage of a sound, both of which methods will demonstrate the presence of the fundus anterior to the mass. Should they become calcified, —a change to which they, more than fibroids in any other situation, are prone,—they are usually associated with some ascites. Twisting of the pedicle may occur, with apoplexy of the tumor. This accident is accompanied by intense pain, sudden enlargement, and, usually, immediate production of free fluid in the peritoneum.

¹ Brit. Med. Journ., London, Vol. 2, p. 292.

² Congr. Intern. d'Amsterdam, 1899.

CHAPTER II.

ANATOMICAL CONSIDERATIONS.

As descriptions of the normal anatomy of the uterus, and of all the other pelvic organs, are to be found in standard anatomical text-books, I simply wish here to emphasize certain points which are of importance in operative work. It is, however, necessary to speak somewhat fully as to the vascular supply. The most complete description which has been given of this is that by Pierre Fredet,¹ to whom I am indebted for much of what follows. Afterwards I shall attempt to describe some of the changes of operative importance produced in the normal anatomy of the parts by the development of fibromyomatous tumors.

Points in Normal Anatomy.—1. The posterior vaginal fornix extends for one inch above the highest level of the anterior.

2. A line carried along the upper wall of the vagina, and prolonged backwards to the junction of the third and fourth sacral vertebræ, will pass through the upper levels of both anterior and posterior fornices respectively.

3. The finger placed in one of the lateral fornices directly touches the base of the broad ligament on that side.

4. The distance between the posterior vaginal fornix and the peritoneum of Douglas' pouch is from $\frac{3}{4}$ to $1\frac{1}{2}$ cm. The distance between the anterior vaginal fornix and the peritoneum is from $3\frac{1}{2}$ to 4 cm., the base of the bladder being here pretty firmly attached by connective tissue to the anterior wall of the uterus; this attachment is firmest below, and becomes looser above.

Vascular Supply.—*Arteries.*—The arteries supplying the uterus and the broad ligaments are the uterine, the ovarian arteries (or the internal spermatic), the external spermatic, and the vaginal.

¹ Fredet, J. de l'anat. et physiol. (etc.), Par., 1898, Vol. 34, p. 94.

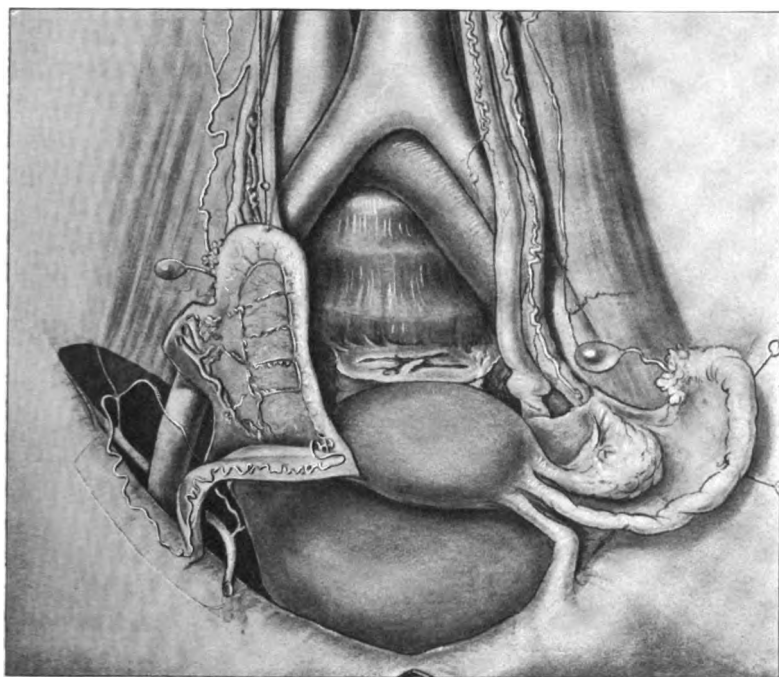


FIG. 9.—THE EXTERNAL SPERMATIC ARTERY.

Shown on the (patient's) right side by splitting the round ligament and raising the posterior leaflet of the broad ligament. (From Fredet. Adapted, by permission, from Kelly's *Operative Gynæcology*.)

Each of these vessels may become of great importance, either because of the general increase in blood supply accompanying the growth, or in consequence of the shutting off of other supply, by ligature or otherwise.

The artery of the round ligament, or the external spermatic, is of least importance (Fig. 9). It unites the external iliac artery with the uterine artery, and through this with the internal iliac, arising as it does from the epigastric or circumflex iliac. Quain speaks of it as an unimportant branch given off from the ovarian artery.

It gives off three branches :

1. Ramifies under the peritoneum.
2. Unites circumflex iliac with epigastric.
3. Largest, and most anterior, penetrates the round ligament, and courses within it towards the uterus. Some branches of this, before entering, also supply the peritoneum.

When the round ligament is split longitudinally, the artery is seen in its centre. The vessel is very convoluted and is about the same size at each end. It is accompanied by a vein.

Ending by anastomosis with the salpingo-ovarian branch of the uterine artery, or with the anterior tubal branch of the same artery, it thus forms a direct communication between the external iliac and uterine arteries. The union, says Fredet, is by a large opening between one or two branches. The subperitoneal branches given off at first, very fine and numerous, inosculate with similar ones given off from the uterine.

The Ovarian or Internal Spermatic Artery.—The ovarian artery leaves the aorta in the neighbourhood of the renal artery, about half-way between this and the inferior mesenteric. It crosses the ureter obliquely, and lies upon the psoas muscle, as it passes downwards and outwards ; at the brim of the true pelvis it turns inwards ; at first straight, it becomes tortuous and ends at the outer corner of the ovary, where it anastomoses with the ovarian and tubal branches of the uterine artery. It also sends a special anastomotic branch to the uterine artery. The veins accompanying it are much larger. Some branches are given off from it at

the brim of the pelvis, which ramify beneath the peritoneum ; one is given off near the division of the common iliac which breaks up into numerous branches anastomosing with the subperitoneal network. The branch to the Fallopian tube also gives many branches to this plexus, which receives also branches from the uterine artery. This anastomosis is of special importance in the case of fibroids which develop beneath the broad ligament. Ligature of the uterine artery alone or of the spermatic alone is of very little use in such cases, since this network also communicates with the epigastric or the circumflex iliac vessels through the artery of the round ligament, and with the vaginal arteries.

The internal spermatic artery, accompanied by veins, nerves, and smooth muscular fibres, raises the peritoneum from the pelvic brim to the edge of the tube, and forms a peritoneal ridge—the infundibular fold. At this point, whilst the vessel decreases in size, it becomes more convoluted, and its convolutions rest upon, or are surrounded by, veins much larger than itself. The veins are not convoluted. Inferiorly, the peritoneal layers come together, leaving a space clear from visible vessels ; this space is of great importance in the ligature of these vessels, or in the removal of the appendages. (See Fig. 25.)

At this point—that is, at the pelvic brim—the vessel gives off sometimes, besides the peritoneal branches mentioned above, a comparatively large branch, which, passing beneath the cæcum or sigmoid flexure, anastomoses with the proper vessels of these viscera.

The artery ends by giving off :

1. A branch to the Fallopian tube.
2. An ovarian branch.
3. A branch anastomosing with the uterine artery.

The first passes up along the fimbriated extremity, and under the border of the Fallopian tube for a short distance below the posterior leaflet of the meso-salpinx. It anastomoses, in the region of the ampulla, with the tubal branch of the uterine artery. Before doing so, it supplies one or two small branches to the outer pole of the ovary, to the fimbriæ, the ampulla, and to the sub-

peritoneal network. After giving off these, it becomes very small.

The second, the ovarian branch, is directed along the attached border of the ovary, giving off several very convoluted branches, which are distributed to the outer portion of the ovary, the furthest anastomosing with an ovarian group coming from the uterine artery.

The third and last branch is situated beneath the others, between the layers of the meso-salpinx, and passing on, continuing the direction of the ovarian artery, anastomoses with the corresponding branch from the uterine artery. The point of union cannot be certainly determined, but whilst the spermatic artery diminishes markedly after the origin of the tubal and ovarian branches, it remains about the same size for a certain distance, then enlarges again, until, near the uterus, it becomes nearly double the size of the original spermatic artery. There can be little doubt but that it has ceased to be a branch of the latter long before it reaches this point. In some exceptional cases, however, the internal spermatic artery does appear to supply blood to the fundus uteri by this branch ; but this is not by any means the usual condition. Still, it occurs with sufficient frequency to explain certain cases in which ligature of the uterine artery has had but little effect on a growth situated in the fundus.

On the other hand, the veins which return the blood from the uterus, and which pass by the side of the ovarian artery, carry as much blood, if not more than, the uterine vein. These veins coalesce into the ovarian veins, which are very long, and empty themselves, the left into the renal vein, the right high up into the vena cava. They may thus easily become varicose. A ligature round the vessels in the infundibular fold will therefore be more likely to produce an overfullness of blood in the parts distal to it than a scarcity of that fluid ; but it will distinctly interfere with the circulation. Some operators, as Beverly, and Tait in his later cases, have tied the tube with the vessels near the uterus ; it will be evident that they have tied the anastomotic branch of the uterine artery, or, in those cases in which the ovarian artery supplies the

fundus, they have ligatured that vessel just before reaching this organ. This will have thus thrown more blood into the subperitoneal network of the broad ligament, which perhaps has not received so much attention as it merits.

The Uterine Artery (Fig. 10).—The internal iliac artery extends from the bifurcation of the common iliac artery opposite the lumbo-sacral articulation towards the sacro-sciatic foramen, near which it is divided into anterior and posterior divisions. From the anterior division passes, downwards and inwards, the superior vesical, the uterine, the hypogastric, the vaginal, and middle vesical arteries, all on a level with the upper edge of the obturator internus muscle. Lower, and on a level with the white line, comes off a vaginal and urethral branch, whilst the main vessel passes on as the pubic artery.

The uterine artery comes off behind the ureter, which crosses it from behind forwards about the level of the internal os, and nearly an inch away from the uterine border. At this point the artery gives off two or three branches running in the same direction as itself, but spreading out like a fan downwards and inwards, supplying the cervix, the upper part of the vagina, and the bladder. It also gives a branch to the ureter. One of these branches anastomoses by the azygos vaginæ with the vaginal artery. It describes a curve with its convexity downwards. Arrived at the border of the uterus, it makes an abrupt bend upwards (Fig. 11), becoming very convoluted and running along the side of the uterus giving off from its side numerous branches, which arise almost at right angles to their parent trunk, and run on to, and into, the uterus. The artery passes upwards nearly to the angle formed by the lateral border of the uterus with the Fallopian tube, where it divides into three branches, one which irrigates the fundus uteri, and anastomoses with that of the opposite side, one which passes into the ovary by its hilum, and anastomoses directly with the internal spermatic, and one which, lying in the meso-salpinx, runs outwards parallel with the Fallopian tube, and supplies it, uniting with the internal spermatic artery. This branch also gives a small branch to the round ligament, which

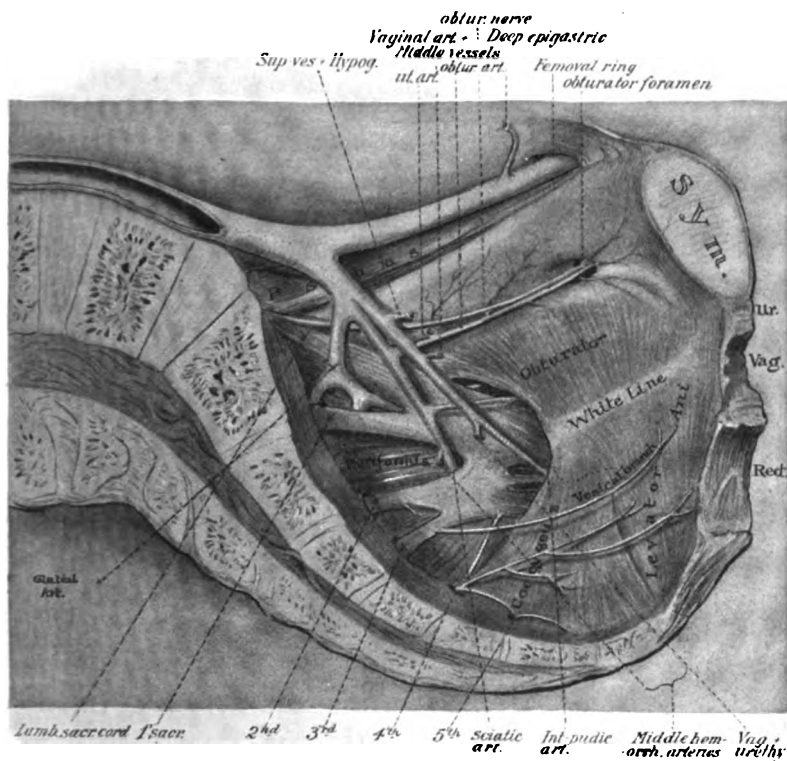


FIG. 10.—SAGITTAL SECTION OF PELVIS, SHOWING POSITION OF PELVIC ARTERIES AND NERVES.

(Taken, by permission, from Kelly's Operative Gynæcology.)

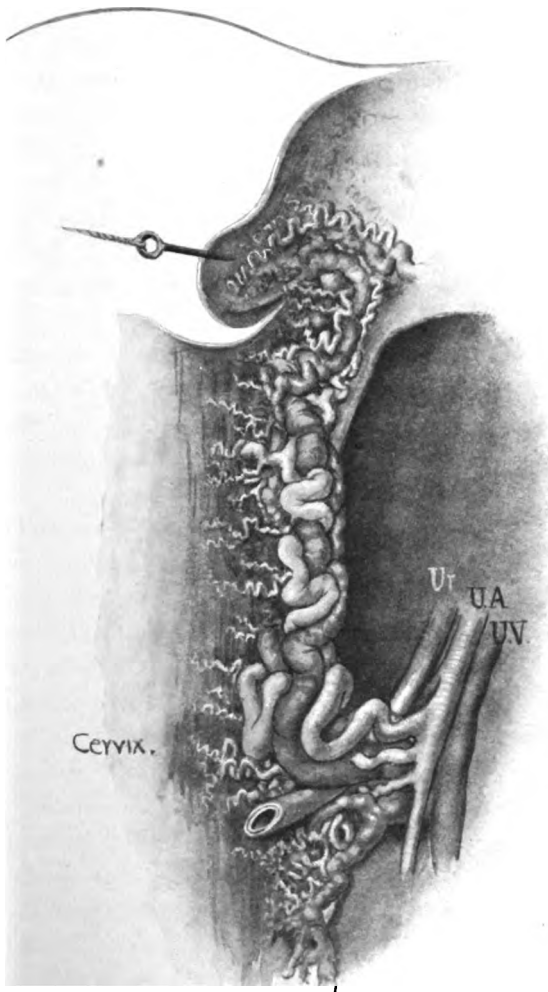


FIG. 11.—UTERINE ARTERY.
Shows relative positions of ureter, uterine artery and vein. (Adapted, by permission,
from Kelly's Operative Gynæcology.)

anastomoses with the deep epigastric, through the external spermatic artery.

Fredet¹ declares that the uterine artery *alone*, in the majority of cases, supplies the entire uterus, and that the spermatic artery furnishes no part of its supply. Rarely, however, the latter artery does supply the fundus. This conclusion is based upon the examination of 17 uterine arteries—2 in the fœtus, 2 in children, and 13 in adults. Broeckaert, in 1892, reported also in favor of this view, basing his opinion upon the examination of 46 arteries. He believed, moreover, that the spermatic artery terminated at the external angle of the ovary; the uterine artery mainly supplying this organ. Weber and Theile² held the same view as that of Broeckaert. Hyrtl,³ however, represents the internal spermatic artery as normally giving branches to the uterus near the fundus, and Fredet himself gives a drawing showing this condition, but describes it as abnormal, and existing only on the one side even in this case.

The branches given off by the uterine artery before the main trunk bends upwards by the side of the uterus are important for two surgical reasons: First, because they may easily be mistaken for the trunk itself in the operation for vaginal ligature, the main vessel thus escaping; and, secondly, because from their anatomical disposition the current of blood in them is more directly sent to the tissues which they supply than is that in the vessels coming off at right angles from the main trunk, and supplying the body of the uterus. Neoplasms, therefore, situated in the cervix are likely to have a more rapid evolution than those in the uterus itself, a prediction which clinical observation justifies. In the abdominal ligature of the uterine artery, with a view to atrophy of such growths, it is also evident that it is important to tie the vessel near its origin, or to tie all these vessels so as to include these branches, else the effect of such ligation will be the opposite of that desired:

¹ Fredet, J. de l'anat. et physiol. (etc.), Par., 1898, Vol. 34, p. 94.

² Encycl. anat., Par., 1843.

³ Die Cor. Anat. u ihre Ergebnisse, Wien., 1873.

the flow of blood into the main vessel being stopped, a greater supply may be diverted into the vessels actually supplying the growth.

The main trunk, passing upwards by the side of the uterus, gives off branches towards it. Hyrtl describes eight to ten short transverse branches, dividing quickly into two, anterior and posterior, which penetrate the uterine tissue. They pass in a spiral or tortuous fashion, and anastomose freely. Quain¹ says the arteries of the uterus are remarkable for their frequent anastomoses, and also for their singularly tortuous course. After passing a short distance into the thickness of the uterine wall, they divide into branches, which penetrate the muscular tissue of the mucous membrane, supplying it with capillaries, and then pass towards the inner portion of the membrane and open into a network of large capillaries which pervades the tissue in that situation, and is especially developed near the surface, and around the glands. In the cervix, however, and especially in the vaginal portion, the arteries,—which in this situation possess walls of considerable thickness,—after entering the mucous membrane divide into a number of small branches, which pass directly towards the surface and open into the capillary network there present, from which loops pass into the papillæ.

Hyrtl divides the anastomoses into transverse, vertical, and antero-posterior, but the important point is that one injection will fill them all unless they are diseased, not only on one side, but on both. As the upper branches unite with the spermatic arteries, and the lower with the vaginal, ligature of the uterine arteries does not necessarily produce necrosis of the uterus; but it must be remembered that it very greatly lowers, for some time at least, the pressure of the blood supply, since time is required for the compensatory enlargement of these subsidiary vessels. If, then, a neoplasm is present in this tissue, the proper nutrition of which is already very low, as is the case in fibromyomata, such lowering may depress its blood supply to the point of extinction, and necrobiosis or sloughing result.

¹ Quain's Anat., 10th edit., Vol. 3, pt. 4, p. 269.

Apart from these, the uterine artery gives off, near to its origin, several branches which ramify beneath the peritoneum ; branches, as before noted, to the ureter, which are long and sinuous ; and to the bladder.

The veins follow the arteries very closely.

By the sides of the uterus there is one group of veins situated in front, one behind, and one outside the uterine artery ; these empty above into the ovarian veins and below by the uterine vein, which commences near the level of the internal os, and receives also the blood from the anterior vaginal group. The trunk so formed lies in front of the uterine arterial trunk. It passes in front of the ureter, and, curving round it, becomes posterior to it. Just before it reaches this point it receives a second venous group, beginning in the wall of the bladder and anastomosing with the obturator veins. These also receive the posterior vaginal veins. Chris. Martin thinks the veins, in many cases, are much more formidable, from a surgical point of view, than the arteries.

Vaginal Arteries.—These differ very much in various subjects.

In one case the uterine artery gave off in the middle of its parieto-uterine curve two large anterior cervico-vaginal arteries. One passed almost transversely, divided, and penetrated the vaginal wall in immediate contact with the mucosa ; the other, given off near the uterus, followed a similar course, but was carried lower.

The lower two-thirds of the anterior wall of the vagina were supplied by branches from the hypogastric artery. This artery gives off, higher up near the pelvic wall, two groups :

1. The vessels of the anterior group cross the ureter, and take the same course as those derived from the uterine artery. They form an anastomosing network beneath the vaginal mucosa. An anterior azygos artery comes also from this source.

2. A posterior group, arising at the same point, passes to the side of the vagina, and supplies both faces, anterior and posterior.

The uterine minute arteries and capillaries are convoluted, a point which explains the whorled appearance of the fibres developed upon them in fibromyoma. All the vessels are evidently designed in

this way in order to allow for the rapid alterations in size during and after pregnancy.

The Ureter.—The ureter lies beneath the peritoneum during its whole course from kidney to bladder. It passes down on the surface of the psoas muscle to the pelvic brim; crossing the common iliac just before its division, and lying to the inner side of the internal iliac artery, it passes beneath the uterine artery, and enters the base of the bladder, passing under the end of the ileum on the right, and the sigmoid flexure on the left. Its passage over the brim of the pelvis is about half-way between the posterior central line ($1\frac{1}{2}$ inches from it, according to Kelly) and the point where the upper edge of the broad ligament would strike the pelvic brim, if produced as a straight line. Therefore it is not liable to injury in tying off the appendages. It sinks down into the pelvis beneath the peritoneum which lines the outside wall of Douglas' pouch, and comes forward therefore at the base of the broad ligament, which it enters from behind. It is always below the uterine artery. At the level of its crossing the uterine artery it is half-way between the cervix and the pelvic wall. Anterior to this, it appears parallel to the upper anterior vaginal wall, where on each side it forms the ureteral fold visible from the vagina. In this position it may be felt, if the patient is in the lithotomy position, the index-finger being carried high up into one of the lateral fornices, pushing it upwards and outwards towards the pelvic wall, or, still better, between the fingers of the two hands, one in the same position, the other applied over the abdominal wall and pressing downwards and inwards. The only structure which can be mistaken for it is the obturator nerve, since arteries pulsate and veins are too collapsible and thin-walled to give the necessary resistance. The obturator nerve may be distinguished, since if slight traction or even pressure be made upon it, pain will be felt on the inner side of the thigh. Besides, the nerve lies further out, and can be traced as running downwards and outwards towards the obturator foramen, not inwards towards the bladder, as is the direction of the ureter. Kelly mentions the arch of the levator ani muscle and strands of the internal obturator muscle as likely possibilities of

error, but I think no one accustomed to bimanual examination would be confused by them.

The Bladder.—The relative position of the bladder depends upon the amount of fluid contained. If empty, its upper surface forms a cup-shaped depression rising in front to about half the height of the symphysis pubis ; behind, it rises again, meeting the uterus at the level of the internal os, so that rather more than one-half of the entire—unimpregnated—uterine length, from fundus to os uteri, lies free above it. When the bladder fills, it rises in the centre and unrolls itself, so to speak, from behind the pubes, its apparent upper limit striking the face of that bone at higher and higher levels, until when full it may appear to start from the internal abdominal wall. This condition becomes no longer temporary, but permanent, and still more exaggerated, during the development of tumors in the anterior uterine wall or in the broad ligaments, so that the abdominal wall may require opening near the umbilicus in some cases simply in order to reach the abdominal cavity above the bladder ; whilst after the removal of the mass it is startling to find, when closing the abdominal wound, that the bladder has no longer any relation to it, but has already resumed its normal or almost normal position. The bladder is, indeed, a triangle, of which the base and two lower angles are fixed, and formed of firm and almost unyielding material, whilst its two sides and the blunt angle they subtend, and which looks forwards, are moveable, and formed of distensible contractile material.

The Rectum.—The rectum lies close against the vagina and uterus ; attached to the vagina, it is quite free from the uterus, being separated by two layers of peritoneum. Normally, these layers lie closely opposed to one another, so that a finger passed into the rectum sufficiently deeply comes immediately into contact with the posterior uterine wall, the rectal wall and the two peritoneal layers alone intervening. This potential space may, however, abnormally contain the fundus uteri in retroflexion, the ovaries and tubes in prolapse or disease of those organs, small intestine or tumors of the uterus or other adjacent organs ; but all these must be considered as foreign bodies.

Alterations in the Anatomy of Parts Due to Development of Uterine Fibromyomata.—A (1). The tumor is developed in the anterior wall, with disease of appendages. Changes are mentioned in the order in which they may be found in abdominal cœliotomy.

The bladder, as described, may be forced upwards in the loose cellular tissue between the peritoneum and the muscular abdominal wall, or, lying beneath the omentum, it may be dragged up with the enlarging uterus, and lie plastered over the lower segment of its anterior surface. Its upper limit is then easily found. Not only is there a distinct transverse dip or sulcus across the front of the mass, but—whilst the upper part of the uterus is smooth, although bossed—enlarged, fairly numerous, tortuous veins run upwards almost vertically over the vesical surface, to end abruptly at the sulcus referred to. It is important to notice this line, as a transverse incision must be taken through the peritoneum across the uterine front in abdominal hysterectomy, and must be at least half an inch above this sulcus. Should it be lower, there is the risk of opening the bladder, and the certainty of great and unnecessary bleeding, whilst the last step, that of closure of the pelvic peritoneum, may be rendered impossible.

The omentum may be adherent to the parietal peritoneum. It is much more frequently adherent to the pelvic viscera. It may be attached at definite and narrow points. It may cover in the pelvic contents, being attached to the pelvic brim, to the tubes, to the uterus, to the large intestine, or to any one of these. It is rarely attached to the pubis, to small intestine, or to the bladder. Its attached border is thickened for a short distance, usually for less than one inch.

The tube or tubes are enlarged, lengthened (sometimes very greatly), closed at their extremities, and tensely distended. The closure of the abdominal extremity may be partly completed by omentum. Great care must therefore be taken to avoid dragging upon this structure during separation. It is safer to tie it and divide at a little distance. The ovary may lie in a coil formed by them, or be entirely separate. In one case, after removal of the

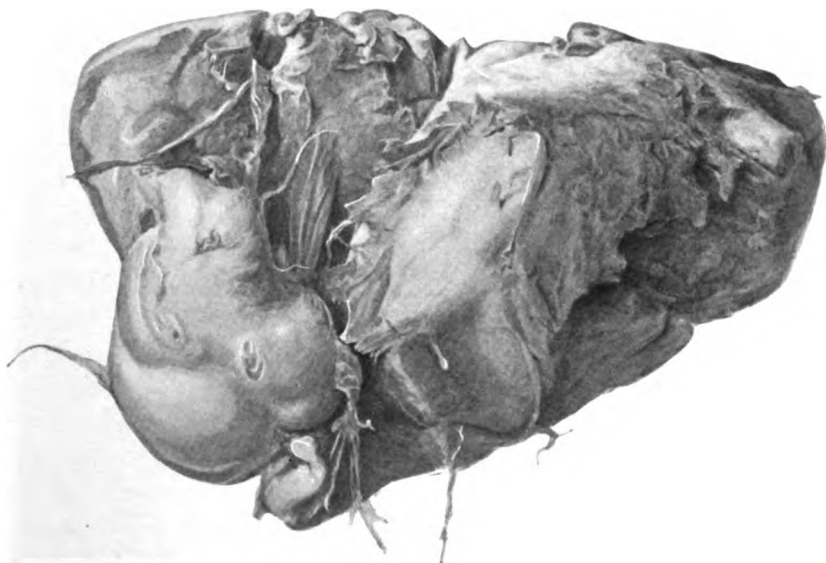


FIG. 12.—POSTERIOR SURFACE OF FIBROMYOMATOUS UTERUS WITH OVARIAN ABSCESS AND PYOSALPINX ADHERENT ON THE LEFT SIDE. ADHESIONS TO PERITONEUM IN DOUGLAS' SPACE.

Removal, Sept. 14, 1899. (Across widest part, $5\frac{1}{4}$ inches.) M. C., æt. 43. Invalidism 21 years, dates from birth of only child. Uterine polypus removed 2 years ago. Right pyosalpinx removed 4 years ago.

uterus and tubes, with one ovary, I found the other, a thick-walled ball of pus, embedded in tough connective tissue, entirely unconnected with the Fallopian tube of that side, and lying upon the psoas muscle. The tube is often found to be adherent either to the back of the uterus or of the broad ligament. (See Fig. 12.)

A (2). On the other hand, the appendages may be normal in size—not being themselves diseased. In this case they will either hang down almost vertically at the sides of the tumor,—the infundibular ligament passing upwards at a more or less acute angle from the pelvic brim to reach the base of the distal end of the Fallopian tube,—or both tube and ovary may be spread over the enlarged uterus, or a tumor developing in the broad ligament which has grown on one side between the layers of the meso-salpinx. In these cases there is rarely any adhesion. Adhesions always mean some irritation of the peritoneum,—plastic peritonitis,—and are therefore associated with inflammatory conditions; most frequently with inflammatory states of the appendages. The mere enlargement of the uterus, although irregular, is yet perfectly smooth, and presents a smooth surface to the visceral peritoneum; therefore adhesions are very seldom present in such cases.

B. The tumor may be developed mainly in the posterior wall. The differences as to adhesions are the same as above.

Should the tumor develop near the fundus, retroflexion is almost certain. The heavily weighted fundus sinks into Douglas' pouch, and may become impacted by further growth in this position; even then, if no salpingitis is present, there will probably be no adhesions between the peritoneal surfaces, and the difficulty in drawing up the tumor will be due to mechanical conditions, such as the size of the mass, or atmospheric pressure.

On examination per vaginam, a hard, smooth, largely nodular mass will be felt in the posterior fornix, whilst the os uteri itself is carried upwards and forwards above the pubes, and may be entirely out of reach. Bimanual examination will, however, usually detect it, as a swelling of characteristic shape on the front of the tumor. The uterus, on the other hand, may occasionally

be pushed downwards in the vagina, the os being nearer to the vulva than normal. On opening the abdomen in the former case, the bladder is in normal position ; in the latter, its uterine angle is drawn downwards, following the uterus.

C. The tumors are multiple.

The question of adhesions remains the same.

The appendages may, however, be buried between two simultaneously enlarged masses.

The bladder is usually carried upwards in front of and attached to the uterus. The manner of growth, however, is so irregular, and subject to so many variations, that it is impossible to give any definite account of the conditions which may be met with. Most of the points already mentioned require attention. Especial care must be taken of the position of the ureters (see next section). Kelly advises that in case of doubt bougies should be passed into these from the vesical orifice, so that they may be easily recognisable. They appear, when not distended, as flattened bands passing obliquely from behind forwards and inwards towards the base of the bladder.

D. The tumors develop in the broad ligament. These have their starting-place in the cervix or lower lateral wall of the uterus, and are gradually extended from the uterus in the same way and by the same process as subperitoneal growths in those portions of the uterus which are covered by peritoneum. On opening the abdomen, the uterine fundus is found pushed over towards the opposite side. A second, and often much larger, fundus appears to be formed by its side, which is, however, readily distinguished by the position of the Fallopian tube, which is stretched over it from the corresponding cornu of the true fundus. The position of the tube varies. It may lie in front, across the summit ; more often, probably, behind ; but it has a constant relation to its upper surface. Peritoneal adhesions are not common ; they will depend, however, as usual, upon the condition of the ovary and tube as regards inflammation.

The position of the ureter in these cases varies. Inasmuch, however, as it is often very difficult, if not impossible, to be cer-



FIG. 13.—INTRALIGAMENTOUS OR BROAD LIGAMENT FIBROMYOMA.

The uterus is seen lying upon, and partially embedded in, the tumor, which extended into both broad ligaments. Above is a smaller subperitoneal pedunculated mass. The uterine cavity contains a polypoid growth of the same character. Removal, April 4, 1893. Mrs. H., æt. 38. Tumor noticed 6½ years. Intermittent pain from first. Constant pain and rapid increase in size for 6 months. Hæmorrhoids for 3 years. Palpitation and dyspnœa. (Across widest part, 9¼ inches.)

tain in any given case at what precise point the tumor in question first developed, it is wise to suspect the presence of the ureter above the tumor. Should the growth have started in the cervix, it may, during development, push the ureter upwards, and then this tube will be found beneath the peritoneum stretched over the main mass, and dipping downwards behind towards the pelvic floor, and in front to reach the base of the bladder. It is precisely in such cases that Kelly's method of attacking the uterus from the normal side, and rolling out the uterus and tumor towards the side affected, is so useful, as during this process the ureter tends to slip over the surface of the growth outwards, towards a safe position. Great care must, however, be taken, when enucleating the fibroid from the connective tissue of the broad ligament, to use only blunt instruments, or to keep the knife very close to the surface of the tumor, as the ureter becomes flattened, easily mistakable for some band of fibrous tissue rather tougher than usual. It is in these cases especially that the network of small arteries in the broad ligament, which has been referred to, becomes of great importance; as it is much developed, and is fed from all sides.

CHAPTER III.

SYMPTOMATOLOGY AND DIAGNOSIS.

All indications of disease naturally group themselves into three classes, those which are *suggestive*, those which are *characteristic*, and those which are *confirmatory*.

The first class is of some importance, since if not carefully observed, and their connexion with the condition they suggest borne in mind, they may easily be passed over, or they may give a false direction to further investigation.

The second class is, of course, the most important of all, since they can only have one meaning. Such symptoms, however, often are only to be discovered after some search.

The third class contains a number of facts which may be common to several diseases, which in themselves carry little weight, but which, taken in conjunction with those of the first or second class, increase greatly the probability of a diagnosis.

In fibromyomata all three classes are present.

Class 1.—Suggestive symptoms are—

Enlargement of the lower half of the abdomen, usually slow.

Increased amount of blood lost at the menstrual periods or after the menopause.

Increased frequency of losses of blood.

Other vaginal discharges.

Sensations of weight in the pelvis.

Dyspepsia.

Vomiting or slighter gastric disturbances having some relation to the losses of blood.

Colicky sensations, occurring suddenly, and relieved by changes of position.

Sciatic, obturator, or anterior crural nerve pain.

Temporary or persistent urinary irritability or incontinence.

Temporary urinary obstruction.

Albuminuria.

Suppression of urine.

Difficulty in defæcation, usually periodic, but which may occur at irregular intervals.

Tenesmus.

Prolapses of bowel, vagina, or uterus.

Retroflexion or marked anteflexion.

Increased leucorrhœa or hydrorrhœa.

Labor-like pains.

Edema of a single lower extremity.

Unilateral varicose veins.

Enlargement of superficial abdominal veins.

Class 2.—Characteristic symptoms or signs are—

Enlargement of the uterus without symptoms of pregnancy.

If symptoms of pregnancy, enlargement greater than would be proportionate to the age of the embryo.

(These two are usually present, but cases are on record, of which I have seen two, in which, whilst a large subperitoneal tumor was present, the uterus was not perceptibly enlarged. In cases of broad ligament tumors the uterus may be normal in size. I have published such a case, in which the uterus appeared as a small excrescence on the side of a huge tumor.) (See Fig. 13.)

Enlargement hard and nodular, nodules being the size of nuts or larger.

Enlargement general, not so hard, but firm.

If nodular, such nodules have a smooth, defined outline, are embedded in, but do not infiltrate, the tissues.

If the growth is pedunculated, it has a smooth, rounded surface and firm consistence.

The mass may be hard, soft, or elastic, even obscurely fluctuant, but is always smooth and defined in outline.

If mainly elastic, there are also some definitely hard masses.

The tumor is closely connected with uterus, any movement of the one being communicated to the other.

The uterine canal is almost always lengthened, except in some cases where the fibromyoma has developed into the peritoneal cavity and become pedunculated.

Class 3.—Confirmatory symptom and signs are—

Loss of color.

Loss of strength.

Age of patient; from twenty-five years upwards to menopause or beyond. (Exceptions to this are mentioned in chapter I.)

The discharges are not specially offensive unless sloughing occurs.

There is not usually a great amount of pain, whilst in tubal disease—which, however, often accompanies these tumors—there is persistent and continuous pain, intensified at the menstrual periods.

The temperature is subnormal or normal, never elevated unless inflammatory complications occur.

Between the actual hæmorrhages the patient regains a certain amount of strength and comfort. This is most marked in the earlier stages.

I include increased losses of blood at or between the normal periods amongst *suggestive* symptoms because, whilst this is the symptom which is most common in fibromyomata, it is also seen in other conditions—in cancer, for instance, or in villous endometritis. Halliday Croom¹ has also described a case, which he designates one of idiopathic menorrhagia, in which, whilst no neoplasm was present, as demonstrated by a post mortem, the periods became so profuse as to cause the patient's death. On the other hand, in certain cases of pedunculated subserous fibromyoma and of broad ligament growths there may be no marked increase in the menstrual flow, or any intermenstrual bleeding.

Dyspeptic symptoms may sometimes suggest the presence of new growth, or, at least, of irritative conditions in the genital system. I have seen a curious case of this kind.

A woman, æt. 32, came to the Ancoats Hospital complaining of constant sickness. She had been treated by various medical men for gastric catarrh,

¹ Allbutt and Playfair, p. 353.

gastric ulcer, and various other diagnoses, and was referred to the medical side for admission. When she was advised to enter the hospital, she excused herself for the time, giving as a reason that it was her "taking in" week. The oddity of the phrase attracted attention, and she was asked for an explanation. She said that whenever the menses came on, vomiting ceased, and she could take food freely. She reckoned upon this one week in the month to provision herself for the rest. A cirrhotic ovary was found and removed; the vomiting ceased at once and did not return.

Such a symptom, therefore, with such or similar relations to the monthly flow, should suggest pelvic exploration.

Colicky sensations, relieved by change of position, suggest, amongst other things, the presence of a pedunculate subserous fibromyoma, with a fairly long pedicle, which may press upon and temporarily obstruct the fæcal circulation in a loop of intestine.

Pain in the sciatic, obturator, or anterior crural nerves is easily understood. This pain may be constant or intermittent, according to the locked or moveable condition of the fibromyoma pressing upon these nerves. It is usually increased by constipation, since the loaded condition of the rectum still further decreases the available pelvic space.

Urinary irritability or obstruction may be produced in various ways. Should the fibromyoma be in the fundus, it is very likely to produce retroversion or flexion. The fundus uteri, being persistently dragged backwards, will in its turn drag upon its anterior broad attachment to the bladder. As the urethra is a fixed point, such dragging tends mechanically to narrow its vesical opening, and increasing difficulty will be produced in the expulsion of the bladder contents. Spasm affecting the sphincter may also be set up, and the bladder becomes more and more distended. If the growth is situated in the cervix, and is very large, it may by mechanical pressure obstruct the passage of urine.

Leucorrhœa may be either produced or greatly increased by the presence of submucous fibromyoma. Occurring, as it does, in many other conditions by which the endometrium is irritated, it is a symptom of very little value in itself, and merely serves to suggest the possibility of a growth.

Labor-like pains are found in pedunculated submucous fibromyomata, but may occur in other conditions not fibromyomatous.

Unilateral œdema of the lower extremity is very suggestive; and, like unilaterally distended veins, is due to pressure above upon the efferent vessels of the lower extremity. As the tumor is usually asymmetrical in its development, it tends to press unequally upon the veins and lymphatic trunks in the pelvis, and the results of this pressure are seen in the corresponding limb.

Of all the signs of fibromyoma, the one I believe of most importance is the defined smooth outline of the growth. It may be soft, it may be extremely hard, it may convey a distinct sense of fluctuation to the examining finger,—though this is rare, fluctuation, when present, being usually obscure; moreover, when parts of the tumor fluctuate, other parts around are firm,—or it may be absolutely firm and solid; but no other uterine growth gives the definite smooth outline of a body in, but not infiltrating, the surrounding tissues which is present in this disease. A case seen with Dr. Parkinson, of Manchester, illustrates the extreme value of this sign:

A woman, æt. 65, married 43 years, 7 children, 2 miscarriages. Menses began at 19. Menopause occurred at 54, was prolonged and irregular. Eight years since an intra-uterine polypus was removed.

The parts around the vulva were excoriated by a foul watery discharge, the smell of which suggested carcinoma. The os was widely dilated, with foul, brownish, watery discharges escaping, mixed with cheesy looking debris. Uterus enlarged, rounded, with small bosses projecting into both broad ligaments. There was, however, no infiltration into either of these, the surfaces of the uterus and its projections being smooth, rounded, and well defined. Patient was worn and haggard looking, and had continuously lost flesh.

Here the age, the history, the appearance of the patient, and the smell of the foul discharge all pointed to carcinoma, but, relying upon the defined rounded sensation given to the examining hand, a diagnosis of sloughing fibromyoma was made, which the operation and sequent microscopical examination proved to be correct. The growth is figured No. 16 and the micro-section Fig. 17.

A definite diagnosis is arrived at in this way :

The attention being arrested by one or other of the suggestive symptoms, an examination is made, and a swelling discovered in the abdomen.

Dullness extends from some point down to, and is continuous with that of, the pubis.

Under no circumstances can the fingers be insinuated beneath the lower border, so as to touch the sacrum (Jenner).

These two observations exclude all growths springing from a purely abdominal organ. The swelling, therefore, springs from some pelvic source.

It is continuous with and moves with the uterus.

This excludes non-uterine growths, especially growths springing from the bony pelvic walls.

The uterine canal is lengthened.

This strongly suggests fibromyoma, but is common to subinvolution, metritis, deciduoma malignum, and cancer of the fundus uteri.

The swelling is painless.

This excludes metritis and inflammatory conditions of the appendages.

The tumor is firm, and harder than the normal uterus.

This excludes subinvolution.

When the sound is gently passed, it does not provoke fresh hæmorrhage, it is usually deflected from the normal direction, and, with this in the uterus, a finger in the rectum or a hand on the abdomen detects a firm mass between the two. The mass is clearly defined, rounded, and does not infiltrate surrounding tissues. Usually this test can be dispensed with, and, I believe, should always be avoided, if possible. Many cases of septicæmia have followed the use of this instrument, and if the least suspicion of pregnancy exists, it is quite inadmissible. Recto-bimanual examination will generally furnish quite as much information. If further evidence as to the interior of the uterus is needed, as in the case of possible submucous pedunculated growths, it can be obtained in a much better and safer way by dilatation of the cervix.

This excludes deciduoma and fundal cancer and is pathognomonic of fibromyoma.

Having satisfied oneself that the case under consideration is one of uterine fibromyoma, there still remains the question as to the form of growth present, of great importance from the point of view of treatment. The following are the chief points upon which the surgeon will rely :

The mass is multinodular : it is a hard, multiple, encapsulated fibromyoma.

The mass is firm in places, elastic or even fluctuant in others : it is a fibrocystic myoma.

The mass is smooth, evenly rounded, and firm : it is probably a soft unencapsulated fibromyoma.

The mass extends into one or both broad ligaments : it is a fibromyoma springing from the cervix, and opening up the broad ligament.

There has been a history of great loss of blood : it is a pedunculated or sessile submucous growth or an interstitial growth tending to become submucous.

The pedunculated subserous growths are the only ones which are an exception to these rules. They may present themselves, if the pedicle is long, as a rounded mass, with clear percussion note above and below. Movement laterally of the uterus may convey no sensation of movement in the mass itself. If it has contracted adhesions with extra-uterine tissues, its diagnosis is sometimes very difficult. If it has not, the arc of its movement shows that the axis of the circle of which such arc is a part is situated in the pelvis. Traction upon the uterus may alter its position, or combined traction upon the uterus and the tumor in opposite directions, where this is possible, may demonstrate its connexion. If the pedicle is shorter, the uncertainty decreases. But here, again, the well-defined, rounded, smooth outline is very characteristic. Most, if not all, subperitoneal pedunculated fibromyomata are firm ; usually they are distinctly hard.

Pedunculated submucous fibromyomata have the same smooth, distinct outline, when not sphacelated. Even then, once beyond

the parts actually sloughing, the same characters are observed. The sloughing tissues, moreover, are soft, not intimately connected with small stony nodules, as in degenerating carcinoma. If partially extruded into the vagina, the os uteri is open and its ring can, with care, be traced around the protrusion. The one condition likely to be mistaken for this is inversion of the fundus; which, moreover, may coexist. Bimanual examination through the rectum will always eliminate this possibility, since should it be present, instead of the rounded prominent fundus, felt between the two hands above the vagina, a cup-shaped depression will be recognised, over the edge of which the rectal finger will pass forwards and downwards towards the vagina.

Even in *unencapsulated* growths the same defined outline can be felt. Meadows notes that *intra-mural* and *submucous* tumors are more cellular and less fibrous than subperitoneal, and therefore the rate of growth is greater: their greater blood supply probably accounts for this. Fibromyomata are, he says, much more frequent in the fundus and body than in the cervix; more often in the anterior than in the posterior wall. Pain and discharge are inversely connected, the more there being of the one, the less there will be of the other. The more pain, the nearer will the growth be to the peritoneum; the more hæmorrhage, the nearer will it be to the uterine canal.

Free hæmorrhage or mucoid discharge seldom or never occurs in the subperitoneal variety.

Pain in subperitoneal fibromyomata is increased at the menstrual period.

Tumors are more painful when developing in the anterior wall, and the pain increases or is more constant as the growth approaches the fundus.

If the growth starts from the fundus, pain is felt in the lower dorsal or upper lumbar region.

If in the body of the uterus, pain is felt in the lumbar region alone.

If in the cervix, pain is most acute in the sacral region.

The clinical symptoms of *large adenomyomata* are thus described by Freund ¹ :

Patients are generally between twenty and fifty.

They are not strong and healthy during childhood.

Menstruation appears late. As a rule, they have suffered from anæmia.

There is dysmenorrhœa accompanied by profuse menstruation. (This is a constant symptom.)

The majority are sterile.

Pelvio-peritonitic symptoms occur early.

There is disturbed function of bladder and rectum.

The general health fails.

There is an infantile character of the genitals.

The vagina is short, the fornices shallow, the uterus anteflexed ; the cervix small, widening towards the fundus.

At a later stage both uterus and tubes present irregular surfaces.

But, when all is said, the final diagnosis will mainly depend upon the sensation received by the educated hand ; and therefore becomes easier with experience and practice. In this connection, too much stress can hardly be placed upon *recto-bimanual* exploration—under an anæsthetic, if necessary. One or two fingers in the rectum will reach higher and convey more information than when introduced into the vagina, if combined with the counter-pressure of a hand over the abdomen. Rectal examination alone, or abdominal examination alone, is misleading, or frequently entirely negative ; but the combination of the two will clear up most pelvic conditions, if due patience is exercised. This last is absolutely necessary. A hurried or superficial exercise of this manœuvre is useless ; the abdominal muscles must be allowed time to relax, and to permit the fingers of the hand placed over them to penetrate, so to speak, the recesses of the pelvis. Sufficient patience and a warm hand will very frequently indeed obviate the necessity of anæsthesia. Of course, in some cases the growth is so large and obvious as not to require such search, but in all cases much information may be obtained in this way.

¹ *Am. Journ. Obst.*, N. Y., 1896, Vol. 1, p. 296.

CHAPTER IV.

DEVELOPMENT.

The key to a proper comprehension of the development of these tumors is to be found in the behaviour of the vessels of the uterus, and not only of the uterus proper, but of all the muscular prolongations from it. These prolongations are to be seen most markedly in the round ligament, the Fallopian tube, the ovarian ligament, and the utero-sacral ligaments, but they are also present in the form of scattered bands in the broad ligament, all of which are in direct connection with, and may be looked upon as direct continuations of, the uterine muscle. They all arise from the same blastodermic layer, are supplied by vessels from the same system, and are liable to similar tumor formations.

Uterine tumors may, from this present point of view, be divided into three main classes, differentiated sharply by their origin and development; all, however, depending upon changes essentially confined, in the first instance, to the vessels alone:

First, those depending upon changes in the endothelium of the vessels—sarcoma.

Second, those depending upon changes in the muscular wall of the vessels—hard and soft fibromyomata.

Third, those depending upon formation of new vessels—telangiectatic and lymphangiectatic tumors.

This, I believe, will be found correct, though other views are held; thus, sarcoma of the uterus has been described by Virchow, Birch-Hirschfeld, Chrobak, and Gusserow as a degeneration of a fibromyoma beginning in the ordinary way. Virchow says that it begins by the proliferation in certain points of the intercellular layers; the cells increase by division; at first they are small, later they increase in size, and show large nuclei, like hard mucous

corpuscles, whilst the intercellular substance becomes looser and softer. Whilst the spaces enlarge, the muscular tissue disappears entirely in many parts; in others it persists, and even becomes more abundant. And cases undoubtedly do occur in which, clinically considered, the tumor appears to commence as a pure fibromyoma, but, after a fairly prolonged period of slow growth, takes on suddenly much more rapid development, and is found, on post-operative examination, to present cells of both types. Thus, Alban Doran ¹ showed a case at a meeting of the London Pathological Society in 1890 of a patient *æt.* 31. Tumor observed for four years; grew rapidly during the last few months. Sprang from fundus, the uterine wall forming a complete and extremely vascular capsule. Tumor contained much blood; on section, was uniform pale yellow color, mostly made up of well-formed, plain muscle cells, but included large collections of relatively short spindle cells, with broad oval nuclei. No metastatic deposits. A similar case is reported by Dr. Finlay in 1883, with wide-spreading secondary deposits. In this case a hard swelling had been noticed in the abdomen for fifteen years before rapid increase in size occurred. Lee Dickenson ² cites a case of fibroma becoming sarcomatous. Schottländer has proved that glandular and epithelial growths may be found deeply seated in myomatous tumors. Liebmann and others have found metastatic deposits of pure myoma in the lungs, the primary growth in some cases being what he calls myocarcinoma. Wilkinson ³ showed a specimen, with micro-sections of uterine sarcoma, at the Sheffield Medico-Chirurgical Society in 1894. Death two and one-half months after hysterectomy, from extensive secondary deposits in lungs. Eighty-one cases in all have been recorded. The temperature charts are similar to those of pyæmia. Langerhans ⁴ found post mortem a true malignant uterine tumor, with secondary growths in lungs and pleura. Microscopically, uterine and secondary

¹ Brit. Med. Journ., London, 1890, Vol. 1, p. 1069.

² Lancet, London, 1894, Vol. 1, p. 22.

³ Ibid., p. 155.

⁴ Berlin. klin. Woch., No. 14, 1893.

growths showed plain muscle cells and fibrous tissue. The tumors growing outside the uterus in this case, and breaking through the capsule, were soft, whilst those in the uterine walls were firm, with a strong tendency to calcify.

In St. Bartholomew's Hospital Museum is a specimen, No. 3015 a², taken from a woman *æt.* 54: Menorrhagia four years previously. Two years before removal the cervix was dilated and an interstitial fibroid was discovered in the posterior wall. The uterine cavity was empty and much dilated. Two years after this examination the patient was reported to be losing weight, and there was profuse hæmorrhage. A portion of growth removed from the posterior uterine wall proved to be sarcomatous. Vaginal hysterectomy was performed and recovery followed. (*Trans. Obstet. Soc.*, 1899, Vol. xli. Micro. section 43. 3015 a².)¹ She is reported to have died some months after, of multiple sarcomatosis. Section of uterus with fibroid which has become the seat of a sarcomatous growth. There is a nodulated fibroid on the fundus and several white masses in the muscular tissue itself, projecting into the cavity of the uterus. These are, for the most part, fibromyomata, but microscopical examination of the growth projecting into the cavity shows the presence of a mixed-celled sarcoma.

Another specimen is numbered 3015 a, and is thus described: The left half of a uterus containing a large mass of sarcomatous growth. The growth is confined to the posterior wall of the uterus, which is greatly thickened. The main portion of the growth is dense and white. Extending above the cervical canal is a softer hæmorrhagic fungation. Microscopically, the growth is a sarcoma, composed of oval and spindle cells. Woman *æt.* 40; metrorrhagia for more than two years. What was supposed to be a sloughing fibroid was removed fifteen months before the hysterectomy; on three subsequent occasions polypoid masses were removed, the cast showing definite evidence of sarcoma. Uterus removed by combined method. Death one week later of peritonitis. (*Micro. section 43. 3015 a*¹. *Trans. Obstet. Soc.*, 1899.)

¹ These numbers refer to those in the Hospital catalogue.

Both cases are contributed by Dr. Griffith.

Pfannenstiel,¹ Orth, Pilliet,² and Costes believe, however, that sarcoma commences *de novo*. The latter authors say: "The endothelium of the blood-vessels is formed normally as large flat cells, which divide, and multiply in the commencement of the sarcomatous transformation, and form around within the vessel a layer of numerous prominent cells. These cells continue to multiply, and form thus several concentric layers. The process extends also to the capillaries, and at numerous points, the sarcomatous cells thus developed continue to multiply in the intermediate substance between the muscular fibres. The latter being irritated by their presence, become hypertrophied, their protoplasm loses its homogeneity, and its structure; their nuclei become granular, irregular, and they end by disappearing, giving place to a sarcomatous tissue, which gradually extends. Whilst the sarcomatous cells develop in the walls of the capillaries, the endothelium cells continue often to multiply by successive layers, and end by obliterating more or less completely the lumen of the vessel. Thus the circulation is arrested in the zone supplied by the small vessel. The sarcomatous tissue receiving no further nutritive material, necroses, and a small cystic cavity is formed. If a large number of vessels are thus affected, a large sarcomatous cyst is formed."

Paviot and Berard³ deny this endothelial origin, since in their specimens they have seen neither arrangement of growth around the vessels, nor endo- or peri-vascular formations which could be attributed to endothelium; the formation of cysts in the way described above has also not been observed by them.

Meslay and Hyenne, however, declare positively that in their sections these three things are clearly demonstrated, and in Hyenne's thesis a plate showing these changes is given.

Three facts appear to confirm this view. The vessels of sarcoma are mere channels in the growth; they have no walls properly so called. Hence we must either believe that, as above described, the

¹ Virchow's Archiv, Bd. 127, S. 305, 1892.

² Société de Biologie, 1894.

³ Arch. de med. experimentale, Nos. 4 and 5, 1897.

change begins at first at the innermost layer of such vessels, or that it spreads immediately inwards, and is able to entirely destroy them, so that, however early the observation, no trace of degenerating or healthy vessels can be found, a very difficult thesis to defend. The second fact is the almost invariable occurrence of blood in the pseudo-cysts found in these growths ; and the third is their rapid generalisation by means of the vascular system.

It does not appear proved that there is anything to prevent

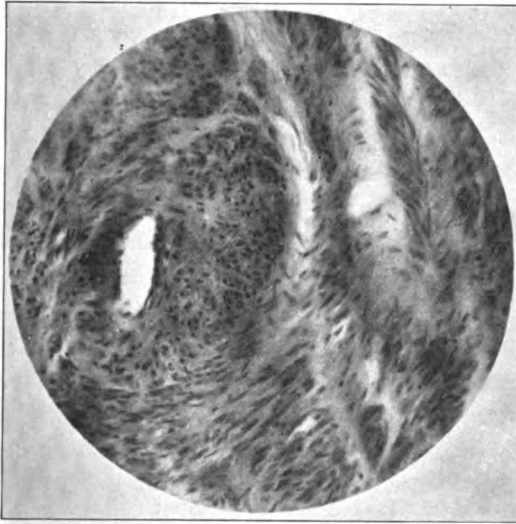


FIG. 14.—PHOTO-MICROGRAPH SHOWING GREAT DEVELOPMENT OF THE MUSCULAR WALL OF AN ARTERY ON ALL SIDES, BUT ESPECIALLY ON THE RIGHT. THE LINING ENDOTHELIUM IS UNCHANGED, THOUGH SOME HAS BEEN LOST IN THE PROCESS OF PREPARATION.

simultaneous or consecutive development of both varieties of tumor in the same uterus.

The commoner forms of hard and soft fibromyomata develop from the next layers, the muscular and adventitia of the vessels.

According to Pilliet,¹ fibromyoma begins in the uterine capillaries. The endothelium remains normal ; the adventitia gives

¹ Bull. Soc. Anat., Jan., 1894.

origin to a zone of embryonic cells, which multiply and develop into rows of concentrically placed smooth muscular fibres arranged around the vessel (Fig. 14). The fibrous layers arise from the transformation of the most peripheral muscular layers, which are furthest from the vessel, and which, therefore, do not receive sufficient nourishment to allow of their normal development. Klebs, Meslay, and Hyenne¹ agree with this description of the initial stage.

Senn² defines myoma as a tumor composed of muscle tissue produced from a matrix of myoblasts, and believed that such might exist independently of pre-existing muscular fibres between which the tumor arises. Virchow believed that they were due to a hyperplasia of previously existing muscular fibres. Green³ says: "The whole uterus is made up of foci of cells awaiting the stimulus of impregnation to great development. A typical development of one focus may occur without the usual stimulus, and perhaps we should rather expect this when pregnancy has been absent or infrequent; so we find that myomata are commonest in elderly sterile women." Kleinwächter found the smallest myomata supplied with a muscular pedicle, which he believes springs from a blood-vessel, and showed that muscular fibres are produced along capillary vessels.

If we adopt Pilliet's view, and there seem to be many reasons for so doing, what is the ultimate cause of this change in certain capillaries? The ultimate cause of any pathological deviation is usually obscure; our present knowledge rarely extends so far, and this condition is no exception to the rule. At the present time it is the fashion to credit micro-organisms with being the originators of most ailments, and it is therefore not surprising to find that certain authors—as, *e. g.*, Galippe and Landouzy⁴—have discovered in fragments of fibroid tumors spherical micrococci which they believe to be the original source of irritation. These cul-

¹ Annales de Gynéc., 1898, Vol. 2, p. 3.

² Senn, Pathol. and Surg. Treatment of Tumors, 1895.

³ Path. and Morb. Anat., 8th edit., p. 124.

⁴ Soc. biologie, 18 fev., 1897.

tures, however, when repeated by Meslay and Hyenne gave only negative results. Of course, it is possible that the life history of the organisms may be too short to permit of their discovery in tumors once formed, effective though they may be in the first instance. Pilliet declares, apropos of a case described by him, that infection was the cause of the proliferation of the vessels. Leguen and Marien ¹ have also verified, they say, the part played by inflammation in the production of these growths.

On the other hand, certain authors see in these growths the results of the development of embryonic structures, remnants of the Wolffian or Müllerian ducts; thus, Ricker ² believes that myoma has usually an embryonic origin. In certain cases very distinct epithelial relics are found in myoma. These seem to represent remains of the primitive epithelium of Müller's duct. Relics of the Wolffian duct are found in the uterine wall. Abnormal growths of muscle cells around the duct are represented in Ricker's drawings. Hence he believes it probable that every myoma originally arises from some abnormal growth of muscle around the Wolffian duct in the uterine wall, or around epithelial relics of the Müllerian duct. He says, however, that not a single authentic case of a cancerous degeneration of a myoma has ever been recorded. Sarcomatous changes have been seen but rarely.

Max Voigt ³ has detected distinct glandular structures in two myomata. Hauser and Diesterweg trace these glands to Müller's duct; Nagel and Brens, to the duct of the Wolffian body. These explain how a fibroid sometimes becomes cancerous, a change which they believe occurs.

Von Recklinghausen, ⁴ following Von Babes, who in 1882 detected true epithelial growths in the interior of uterine myomata, traces these growths, tubular or glandular bodies lined with epithelium, to the Wolffian duct. Coblenz insisted on the pathological importance of the uterine portion of that duct. Von Reckling-

¹ *Annales de gyn. et d'obstetrique*, 1897, p. 136.

² *Virchow's Archiv*, Vol. 142, Pt. 2, Nov., 1895.

³ *Monatsch. f. Geburt. u. Gynäk.*, Jan., 1896.

⁴ *Brit. Med. Journ.*, London, 1896, Vol. 1, p. 665.

hausen finds similar glandular growths in the walls of the Fallopian tube, and traces them also to the Wolffian body. In cystic myoma he distinguishes between true gland cysts, and mere dilated vessels, lymphatics, and cavities formed by the breaking down of solid tissue.

Meyer¹ has continued Von Recklinghausen's researches. He showed, at a meeting of the Berlin Obstetrical Society, sections displaying glandular structures in the muscular tissue of the uterus in the adult and in new-born children. These structures, sometimes acinous, sometimes tubular, were histologically identical with the endometrium. He also brought forward sections showing adenoma clearly derived from the Wolffian duct.

It may at once be admitted that in certain cases the tumor, when situated in the cervix, may be due to development of embryonic tissues, relics of the Wolffian duct, and that such growths may, and probably will, as Voigt has shown, become carcinomatous.

Klein² traced in a new-born girl the left Wolffian duct from the parovarium through the broad ligament; thence to the lateral wall of the corpus uteri and cervix. It next made an S-shaped bend, and, passing over the fornix and along the vagina, terminated in the hymen. Whilst passing through the uterus, it formed numerous branches and ramifications, and this may be the origin of adenomyomata, as already stated by Von Recklinghausen. Unilocular uterine cysts or cystic myomata may result from its abnormal proliferation.

But such an origin will certainly not explain the development of the great majority of these tumors, whilst it will readily be seen that Pilliet's theory renders clear many points of universal observation. In the multiple hard encapsulated tumors of the fundus and body, the only source of direct nutrition, apart from possibilities of osmosis, is to be found in the small vascular pedicle which enters the tumor at one point. All other tissues are simply compressed out of the way of and around the growing tumor.

¹ Centralbl. f. Gynäk., No. 24, 1897.

² Germ. Gyn. Cong., Leipzig, June, 1897.

The slight connective-tissue threads present, which apparently unite the tumor and its so-called capsule, are such as would be found around a vessel when they are frayed out and attenuated by pressure and by the movements produced by uterine contraction. If the tumor is indeed the result of alterations and enlargement of the vessel itself, no accessory vessels are likely to enter it, and the cells outside, which first undergo the fibrous change, are really, as they should be, furthest from the blood supply. Under any other circumstances they would be the nearest, being closest to the surrounding tissues. The correctness of this view is emphasized if we examine cases in which calcification has begun. Lime salts are deposited in tissues in which circulation is scanty rather than in those in which the interchange of material consequent upon free arterial supply is greater. If the nutrition of these tumors comes from without, from the tissues in which an interstitial fibroid is enclosed, calcareous deposits should be first laid down in its centre ; if, on the other hand, its nutrition depends on a central vessel alone, those parts most distant from it, though nearest to surrounding structures, will be first affected—and this is precisely what happens. Figure 15, taken from a specimen, No. 2996, St. Bartholomew's Hospital Museum, shows well the shell-like layer produced at the extreme periphery of the fibromyomatous tumor itself, but inside the "capsule" in the early stage of this form of secondary change, long before the entire tumor is affected by it, and whilst still the central region presents the ordinary structure. Necrobiosis attacking a certain nodule, on the other hand, due to the plugging of the central vessel of that particular nodule from any cause, affects these nodules entirely, and the whole nodule softens and liquefies, leaving a cavity into which, when once this fluid portion is removed, other nodules whose nutrient vessels are unaffected, now relieved of peripheral pressure, project. Such a cavity with projecting surrounding nodules is shown in figure 6, from a specimen in the Hunterian Museum, No. 4607 B. The whorled arrangement of the tumor fibres is also explained. All the uterine arteries are convoluted, to permit of the rapid alterations in size of the uterus in pregnancy and at parturition. The fibres of a

tumor developed in the walls of such vessels must follow their convolutions. If developed in the uterine muscle itself, such convolutions would not be unavoidable or probable, since the uterine muscle is made up of interlacing, but comparatively straight bands. That nerves should have been traced into these tumors, as has been done by Bidder and Hertz, was also to be expected, if this account of their origin is correct. Lastly, the difference between the rapidly growing but comparatively soft tumors of the cervix, and the hard, multinodular, slow-going tumors of the body and fundus is explained by the freer and more direct blood supply of the former, as already described in the chapter on anatomy.

That glandular structures should be found in the submucous tumors, those which really originate immediately below the endometrium, and are not simply forced inwards by uterine contraction, is easily understood, if it is remembered that the endometrium has no submucous layer, but that the fundi of the glands of this structure lie embedded between the fibres of the muscular wall itself, there being no separating submucosa. During the development of any two or more tumors it is extremely likely that gland tissue may be caught, and portions of gland pinched off, to be found later embedded apparently in its substance; but this is simply incidental, and in no way an essential element to the growth.

The development of telangiectatic or lymphangiectatic growths is more difficult to understand. They are much more rare.

Senn ¹ says they are tumors produced from a matrix of angioblasts; they are composed, therefore, of vessels of new formation. Weil found, projecting from the wall of old and new capillary vessels, streaks of protoplasm, which showed nucleated projections, which in the course of time became laminated and were traversed by blood from pre-existing vessels. In other places he found proliferation of the endothelial cells which formed buds and projected into the surrounding tissues. These masses of endothelial cells become hollow and receive blood from the vessels from which they spring. Rokitansky described the formation of blood spaces in the connec-

¹ Pathology and Surgical Treatment of Tumors, p. 442.

tive tissue, which secondarily became connected with vessels. Langhaus noticed a proliferation of the endothelium of the venous spaces in a splenic tumor of this kind. Senn thinks that either condition depends upon the position of the angioblasts. If in a vessel wall, this buds, forming new vessels continuous with old ones ; if displaced into the connective tissue, new blood spaces will be formed in this, later receiving blood from vessels around. If this explanation is correct, such tumors must be of congenital origin, starting into new development at certain ages, and tending to grow indefinitely, as all such tumors do. Their affinity with sarcoma, histogenetically, will be obvious, and clinically the relationship is marked. Kelly ¹ figures a beautiful specimen of telangiectatic myoma (Plate XX), but gives no history. Aslanian ² describes such a case, æt. 40 : Abdominal tumor much larger than pregnancy at term. No hæmorrhage. Tumor soft, semi-fluctuant ; resembled multilocular ovarian. At operation enormous soft growth attached by broad pedicle to left side of uterus. Pedicle contained numerous large veins. Weight, over 24 pounds. Uterus bore also some small myomata. Several pints of blood oozed from the cut surface, but there was no distinct cystic cavity. The tissue was rich in highly developed venous plexuses. Stroma sarcomatous. There had been no anæmia, no menorrhagia or irregularity of catamenia. Recovery. Cases are also recorded by Leopold and Schroeder.

A typical example of lymphangioma is recorded by Matlakowsky and Przewosky.³ It was the case of a woman, æt. 34. There was a history of several years' dysuria and hypogastric swelling following each period. The tumor had been noticed for three years. A week after each period transparent fluid ran from the vagina and the tumor became smaller. The sound passed 10 inches when the tumor was largest, the blunt end being felt close under the skin in the umbilical region. Tumor involved posterior lip of os. Hysterectomy. Tumor was cavernous lymphangioma. The wall of the tumor had evidently yielded at each period.

¹ *Operative Gynec.*, Vol. 11, p. 383.

² *Archiv. de Tocol. et de Gynec.*, fev., 1895.

³ *Central. f. Gyn.*, No. 12, 1892.

CHAPTER V.

SECONDARY CHANGES.

Once a fibromyoma develops, its future will still depend greatly, almost entirely, upon the behaviour of the vessels within and around it. Should their calibre be decreased and their number diminished, the first change will be a *fibrous transformation*.

This would appear to be the most frequent, and its result is the hard, multinodular fibroma of Tait. Around the perivascular muscular nodules, produced as described in the preceding chapter, there form other layers, which, being further from the sources of nutrition, do not develop into muscular fibres, but produce a fibrous tissue, which, by its contraction, still further diminishes the supply of blood to the internal layers, that, in their turn, tend to become fibrous. Meslay and Hyenne¹ describe three appearances which these growths may show under the microscope :

First.—The tumor presents the connective internodular tissue much developed, and the myomatous nodules themselves show concentric rows of muscular fibres which stain lightly whilst others are replaced by fibrous tissue.

Secondly.—The internodular fibres penetrate into the interior of the myomatous nodules under the form of small more or less thick bands, dissociating and compressing the muscle fibres ; leaving them as irregular islets in the midst of the fibrous mass.

Thirdly.—Only connective-tissue bands are seen disposed irregularly, without order. Vessels are rare ; the greater number are flattened, and their lumen is deformed by the pressure of the surrounding fibres.

As the fibroma enlarges, it compresses not only the structures

¹ Ann. de Gynéc., Par., 1898, Vol. 2, p. 8.

within its own substance, but also those around, which, although not dependent for their nutrition upon the vessel upon which the fibroma has developed, are checked to a certain extent by the pressure thereby exerted, and a fibrous layer is developed, separate from, but enclosing, the fibroma as a capsule; the sole connection remaining between the zone supplied by the capillary which has undergone this change and the parts around being at the point of entrance of the central vessel. In the fibroids of old persons, at and after the menopause, this condition of fibrous degeneration is seen in its most developed form.

Each individual fibromyoma undergoing this form of degeneration is, and remains in itself, of small size, but by mutual pressure several of these nodules arising from adjacent capillaries may appear to coalesce, forming a large mass with an irregularly bossed contour.

The rate of growth of these hard tumors is very slow. Penrose estimates that it may take fifteen years to attain the size of a foetal head. It is probable, moreover, that such a mass will contain several fibroids which, by their agglomeration more than by their growth, have attained even this size.

Something more appears to be necessary in order to produce the next form of pathological change, the *calcareous*, in which salts of lime are deposited irregularly in the substance of the tumor. This is in no sense an osseous transformation, since there is no evidence of bone cells, lacunæ, or canaliculi. It is noteworthy that this form of degeneration is almost always seen in pedunculated growths, subperitoneal or submucous. As far as I can find, it has never been seen in those which are interstitial or intraligamentous, except in old persons, or in those who have undergone some operation decreasing the blood supply. Tait has presented a specimen to the Hunterian Museum (No. 4634 a) removed from a patient who three years before had undergone the operation for removal of the appendages. Such a condition of pedunculation necessarily entails great restrictions upon the nutrition of the growth, since all blood supply must reach it through the vessels of the pedicle, which are still further narrowed by the tension

upon them due to the weight of the tumor. There can be no transfer of nutritive material by imbibition from its surroundings, such as may be possible in the case of a tumor embedded in living tissues. Moreover, the circulation itself must be sluggish, owing to the impediments placed in the way of the return of blood from the growth inherent in the case. Sluggish circulation always favors the deposit of earthy material or salts; a good illustration of this being seen in the deposits of gouty salts in fibrous tissues, where the vessels are scanty and the current slow. Penrose also mentions a case of a woman who had been subjected to oophorectomy, which produces its effects by decreasing the blood supply. It is most frequently observed after the menopause.

In a tumor of this kind described by Arnott, and chemically examined by Professor Daniell, the following was the composition :

Animal matter,	35 per cent.
Calc. phosphate,	56 "
Calc. carbonate,	5 "
Alkaline sulphates, phosphates, and chlorides,	4 "
Magnesian phosphate,	a trace.

Tumors which have undergone this calcareous change sometimes become entirely detached from the tissues with which they have been originally connected, and may be found loose in the peritoneal cavity, or be extruded from the uterine cavity, forming in the latter case what have been called uterine calculi. Although such tumors usually first pass through the stage of fibrous degeneration, it does not appear necessary that they should entirely do so, as smooth muscular fibres have been found in them after removal of the earthy salts by acids (Rokitansky, Hénocque ¹).

When this change occurs, further increase in size ceases. It appears to be one of the final changes in the life of a fibromyoma, and to mark the lowest point but one in nutrition.

Study of such tumors gives additional confirmation to the theory of development advanced in the previous chapter. The lime salts, as already shown, are not deposited at first indifferently through-

¹ Arch. de physiol., No. 4, 1873.

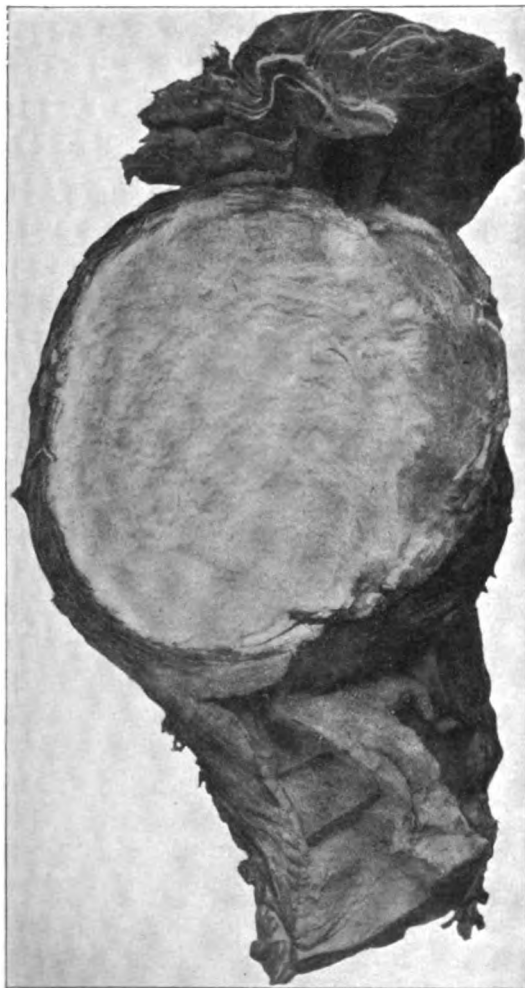


FIG. 15.—CALCIFYING FIBROMYOMA, SHOWING THE MANNER IN WHICH THE LIME SALTS ARE, IN THE EARLY STAGE, DEPOSITED FIRST IN THE PERIPHERY OF THE TUMOR.
(St. Bartholomew's Hospital Museum, No. 2996. Photograph. Actual size.)



FIG. 16.—CENTRAL NECROSIS OF FIBROMYOMA, ATTACKING THE MASS NEAREST THE UTERINE CANAL.

Removal, Jan. 17, 1900. Mrs. H., æt. 40. Three children. Prolapse unrestrainable by pessary. Breathlessness and increase in size. Pain and nausea, increased at menstrual periods. No menorrhagia. (Height, 6½ inches.)

out the tumor, but in its exterior layer, forming a kind of inner capsule. Specimens showing this are to be found in St. Bartholomew's Hospital Museum, Nos. 2995 and 2996 ; in St. George's Hospital Museum, No. 14 B '' ; Guy's Hospital Museum, No. 2280¹². The deposition is not in the true capsule, but in the layer of the fibroma itself furthest from the source of nutrition. Later, earthy salts are deposited throughout. Further specimens of this species of secondary change are to be found in the Hunterian Museum, specimens 4645, 4634 a, 4642.

It is easy to understand that, with tumors whose nutrition is so slight and so dependent upon a very few vessels, that at any moment during their development, and with increasing probability in proportion to their size and weight, a very slight additional interference with their blood supply will be sufficient to produce the last change in this direction—viz., that of *necrosis*. Whether this will be quiet necrobiosis or actual sloughing will depend upon the possibility of entrance into them of pathogenic micro-organisms. If these gain access, the tumor will slough. Naturally, therefore, this latter change is more likely to occur, and, as a matter of fact, does chiefly occur, in pedunculated submucous tumors, and in those which though not pedunculated yet project into the uterine canal. Figure 16 illustrates this point very well. In this specimen three medium-sized tumors as well as a number of small ones were found. Two of the larger ones are seen in the section, and although the upper one is the largest and subperitoneal, with but slight vascular supply, it is not in this tumor, but in a smaller and more deeply embedded one, that a pus cavity is found. This lower one, however, has close relationship to the uterine canal, into which it bulges. If micro-organisms do not find their way into these fibromyomata, they may be either quietly absorbed, passing through a stage of fatty degeneration ; or, if only certain branches of the nutritive vessel be affected, small areas soften, their contents remaining or becoming absorbed, and thus a semi-cystic condition is brought about.

If we accept Pilliet's description of the development of fibromyomata, it is easy to see that those tumors which are hard, and in

which, therefore, there is a great development of the fibrous layers around each formative vessel, may easily find their blood supply inefficient. The growth of the tumor has compressed the tissues around into a kind of capsule, with which its nutritive connexion is but slight—how slight is easily demonstrable by the ease with which these tumors are shelled out when once their capsule is divided. There is always, however, the point at which their main vessel, from the branches of which the fibroma has been formed, joins the general circulatory system. Should this become blocked by any cause, ischæmia of the tumor must result. Even the very growth of the tumor itself will compress concentrically its own vessels, as well as, centrifugally, the vessels of the tissues around. The force of the current in the firmest, being normally but feeble, may find itself depressed by the menstrual losses below the point at which the life of the mass can be maintained. Still more may this occur when, at the menopause, the whole pelvic circulation is diminished. If when such an event takes place no micro-organisms are present to determine putrefactive changes, a quiet necrobiosis occurs, the individual cells become fatty, and may be entirely absorbed, since blocking of the nutrient artery does not necessarily imply an interference with the activity of the lymphatics. It appears probable that such changes occur at the menopause in hard fibromata, and account for the frequent disappearance of such tumors at that period. Should large masses become suddenly ischæmic, whilst actual septicæmia would not occur, the absorption of large amounts of dead material may produce a certain cachexia, which might be dangerous. Vautrin¹ details such a case, in which he found a fibroid 20 cm. by 14 cm. in the posterior wall of the uterus, with the circulation absolutely stopped, brown chocolate in color, with no sign of inflammation around or decomposition within; the patient had shown no signs of septicæmia, but the losses of blood had become continuous, and there was a persistent hydrorrhœa. She was dyspeptic, showed some œdema, and much and increasing general weakness; her complexion was pale yellow,

¹ Ann. de Gynéc., Par., 1898, Vol. 50, p. 92.

and she became cachectic, the latter condition rapidly developing, and therefore hysterectomy was performed. That such a condition does not usually result in patients whose fibroids slowly disappear after the menopause is probably due to the fact that the force of the current is gradually diminished, so that absorption keeps step with a slow fatty degeneration which is not complete everywhere at once.

But whilst total necrobiosis of a fibroid is unusual, partial necrobiosis is fairly frequent, and would appear to account for tumors

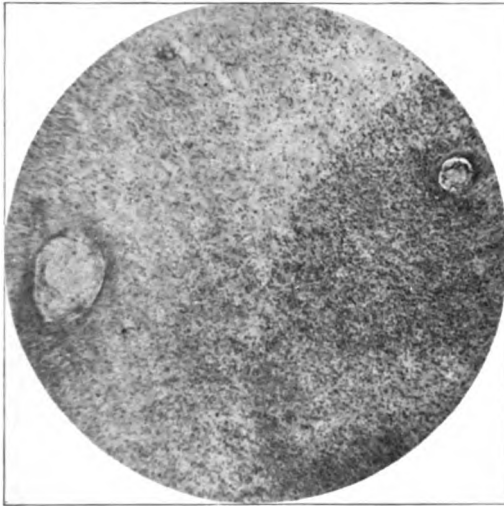


FIG. 17.—PHOTO-MICROGRAPH SHOWING NECROTIC CHANGES IN FIBROMYOMA.
Two small vessels are filled with clot; around are degenerated fibrils and muscle cells.

in which small cavities are found, filled with a brownish liquid, or more or less empty. Such cavities have no epithelial lining, but are mere excavations in an otherwise solid tumor. The want of epithelial lining distinguishes them from those found in angiomatic tumors produced by the dilatation of lymph or blood-vessels. Such a cavity may be seen in figure 16 and in the Hunterian specimen 4607 B (Fig. 6). These cavities are also differentiated from the spaces produced by oedema or so-called myxoma, in that their boundary-line is more or less ragged, and is filled by degenerated

blood and débris, and not, as in the others, by a clear fluid. So far as the cavity and its contents alone are concerned, it would be more difficult to distinguish them from those formed in the sarcomatous so-called degeneration. The rate of growth of the tumor, however, would render this certain. Sarcomatous tumors grow rapidly. Those which are the subject of necrobiosis tend rather to decrease in size.

Figure 17 shows the condition of the tissues of a fibromyoma which is undergoing necrotic change. The vessels are blocked with clot, the cells have become granular, and almost indistinguishable. This photograph contrasts well with the next figure 20, in which fibrocystic change is commencing.

Should micro-organisms find an entrance, the course of affairs is at once, and completely, changed. It is no longer a question of slow necrobiosis, but of acute sphacelation. In proportion as the tumor approaches the mucous surface, is this condition rendered more probable; and clinically, as I have said, we find that submucous and, *a fortiori*, pedunculated submucous tumors are almost alone the subjects of this pathological process. Inflammatory changes in the periphery of a fibromyoma assist in producing sudden blocking off of all nutritive supply, so rendering the tumor an easy prey to the micro-organisms which have produced that inflammation. It is thus that any injury to the capsule, such as was produced by the methods of Duncan and Goodell, infallibly brings about necrosis of the tumor, with all its immense risks to the patient of septicæmia and pyæmia. It is doubtful whether curettage, so much recommended by some authors, is not extremely dangerous in this way. Granted that it removes the hyperæmic mucous membrane opposite to the tumor, and so checks temporarily the losses of blood from that source, it is possible that, practised over the surface immediately in contact with the mass, it may depress too far its nutrition, and by direct traumatism open up a way by which organisms may find access to its substance.

On the other hand, the vessels connected with the tumor may be greatly increased and their calibre be enlarged.



FIG. 18.—NECROTIC FIBROMYOMA.

Mrs. T., æt. 65. Removal of polypus 8 years previously. Seven children. Two miscarriages. Irregular menstruation after 54. Offensive discharge for 5 years. Great pain, increased during micturition. Removal, April 27, 1899. (Across widest part, 5½ inches.)

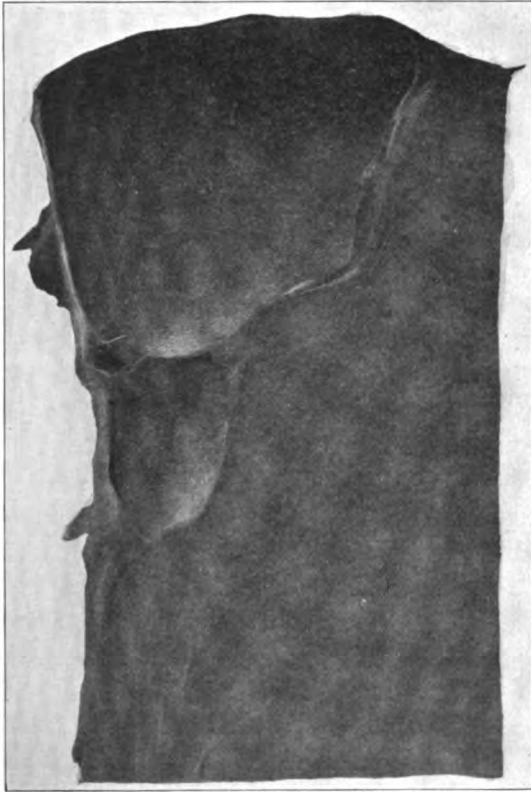


FIG. 19.—FIBROCYSTIC FIBROMYOMA.

Showing the expansion of one nodule by hydrostatic force until its fibres have become flattened out into a thin membrane, against which neighbouring nodules impinge in a characteristically curved manner. Two smaller nodules undergoing the same change are seen immediately below. (St. Bartholomew's Hospital Museum, No. 2992 A¹. Photograph.)

Should this occur, the first change in this category will be that known as *œdematous transformation*. Tumors undergoing this change have been described as myxomatous and as fibrocystic.

Macroscopically, these tumors are large, softened either in parts alone at first, or, later, more and more completely. On section, the softened portions present a gelatinous or colloid appearance, with small cavities, filled with fluid. This fluid coagulates on exposure

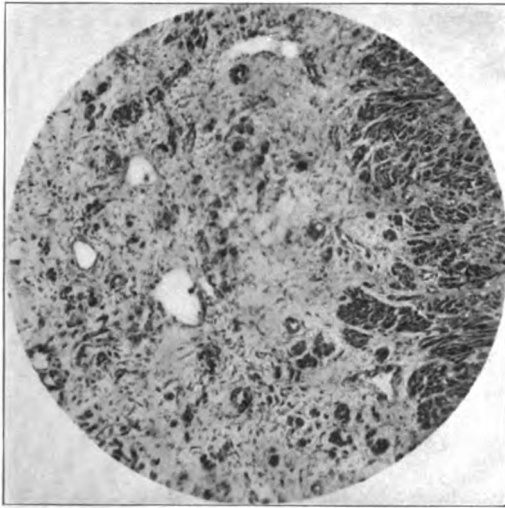


FIG. 20.—UTERINE FIBROMYOMA.

Commencing fibrocystic formation. The fibres and muscle perfectly distinct, but separated by the fluid effused. This has formed small cyst spaces at four points. These spaces have no lining epithelium, but their walls consist of the dissociated fibres. (Microphotograph.)

to the air. Later, the small cavities coalesce, forming large cysts, with incomplete septa, partially separating them. When this degeneration occurs, the tumors somewhat rapidly increase in size. The lymphatics and veins around are notably dilated. Such dilatation and the effusion of fluid into the tissues naturally suggest some mechanical obstacle to the return of blood and lymph from the uterus, but careful search has so far failed to discover any-

thing of the kind. Moschuna's ¹ observations are of interest in this connexion. He showed that such tumors occurred in women affected by generalised arterio-sclerosis. Meslay and Hyenne have noted especially a large increase in the *number* of vessels around the degenerated parts.

The last-named writers describe three stages, macroscopically :

1. A simple imbibition of serous fluid in certain parts of the tumor, which become soft.

2. A dissociation of the fibres by the fluid. Small spaces which gradually enlarge are formed in every part. The tumor appears gelatinous, of a greenish-yellow color.

3. Large spaces or cysts are formed by the fusion of the smaller ones, in the middle of gelatinous masses. These masses are filled with serum (Fig. 20).

Specimens illustrating these changes are to be found in St. Bartholomew's Hospital Museum, No. 2992 ; Hunterian Museum, Specimen No. 4643 b ; St. Thomas' Hospital Museum, No. 2429 a, a very good specimen ; Hunterian Museum, Specimen No. 4643 c.

Microscopically : At first the muscular and connective fibres are swollen and separated by serous fluid. They lose their affinity for stains—at first, in their protoplasm ; later, in their nuclei, which become shrivelled. A fibrillary tissue appears, between the meshes of which there remains an amorphous substance. The infiltration penetrates the muscular and connective bands, separating them into thin bundles. In the second stage these areolæ blend into larger and larger spaces.

The degeneration commences around the vessels in the inter-nodular connective tissue. There numerous embryonic vessels exist, and from this point the process extends, penetrating the nodules from their periphery, and attacking the wall of the proper vessel of the nodule in the last place. Pilliet ² thinks this process is reversed, the centre vessel being first affected.

Examination of the fluid found in these tumors justifies the

¹ Univ. Med. Mag., Phila., Jan., 1893.

² Bull. de la Soc. Anat., Paris, 1894, p. 504.



FIG. 21.—LIPOMA DEVELOPED IN FIBROMYOMA.

From its position and shape, it might be considered as an example of total fatty degeneration of a fibro-myomatous nodule. (St. Bartholomew's Hospital Museum, No. 3001. Photograph.)

belief that they are the result of a serous infiltration, rather than of a myxomatous degeneration. According to Matthias Duval,¹ blood serum contains :

Albuminoid substances,	70-75 per 1000.
Salts { Chloride of sodium }	6-8 per 1000.
{ Sodid carbonate }	

In fibrocystic fluid Meslay and Hyenne found :

Albuminoid substances,	69 per 1000.
Salts { Chloride of sodium }	7 per 1000.
{ Sodid carbonate }	

No mucin, creatine, or creatinine.

The cavities so formed are differentiated from those in angiectatic formations by the fact that they have no lining endothelium, their walls being formed by the fibres of the tumor itself; from those in sarcomatous growths, partly by the microscopical appearances of the walls themselves, but even more evidently by their contents. Sarcomatous cavities contain blood alone; œdematous cysts, serum; which may be more or less stained by blood, it is true; but this is evidently only an incident, and bears but a small proportion to the great bulk of the fluid.

As will be seen, I have described sarcoma, which so many writers consider a degeneration, as a form of development in chapter III. If it is indeed a degeneration, it would find its place here, as the last form of those associated with *increased* vascular supply.

Other secondary changes have been described by older writers. An osseous degeneration is said to occur by Wedl, Bidder, Freund, and von Krauss, but it is evident that this is mere confusion with the calcareous degeneration described above.

Cartilaginous degeneration was said to occur by Cruveilhier and Bernardeaux, but no true cartilage cells have been discovered on microscopical examination.

Fatty degeneration has been seen rarely in sufficient amount to

¹ Cours de Physiol., p. 204, 1892.

justify its description under that name. It would appear to occur frequently enough as a stage in the evolution of others. A specimen, however, in St. Bartholomew's Hospital Museum, No. 3001, shows that it does occasionally occur. In this a small fatty mass, the size of a large nut, has been cut through in the section of a tumor the size of an orange. The fatty mass lies near the periphery, but is surrounded on all sides by fibrous tissue. From this, however, it is cleanly marked off by a distinct outline (Fig. 21).

Carcinomatous degeneration was believed for a long time to occur. Morgagni, Van Swieten, Valentin, and Dupuytren held this opinion. The study of embryology has, however, proved conclusively that it is impossible. Fibromyoma is essentially a product of muscular and connective tissue, developed from the middle blastodermic layer. Carcinoma is a product of epithelium, developed from the upper or lower blastodermic layer, never from the median. The sole possibility one can see is that a number of small fibroid tumors growing in the muscular layer immediately beneath the endometrium might, during their growth, enclose glands belonging to that membrane; that in the epithelium of those glands carcinomatous changes might arise, and so a tumor be formed in which carcinomatous tissue might be found; or that, as described in the chapter on development, portions of the Wolffian duct might start into fresh development, ending in a carcinomatous condition, but neither of these implies carcinomatous degeneration of actual fibromyomatous tissue. On the other hand, it has not infrequently been observed that carcinoma of the tissues of the cervix is coincident with fibroma of the uterine body. Such a case is figured below (Fig. 22).

From what has already been said, it is evident that a semi-fluctuant or cystic condition may result from various causes:

First, from œdema, producing the commoner fibrocystic tumors.

Secondly, from sarcoma, producing blood cysts.

Thirdly, from tele- or lymphangiectasis, producing blood or lymph cysts.

Fourthly, from necrobiosis, producing a pseudo-cyst, which contains a fluid full of necrotic débris.

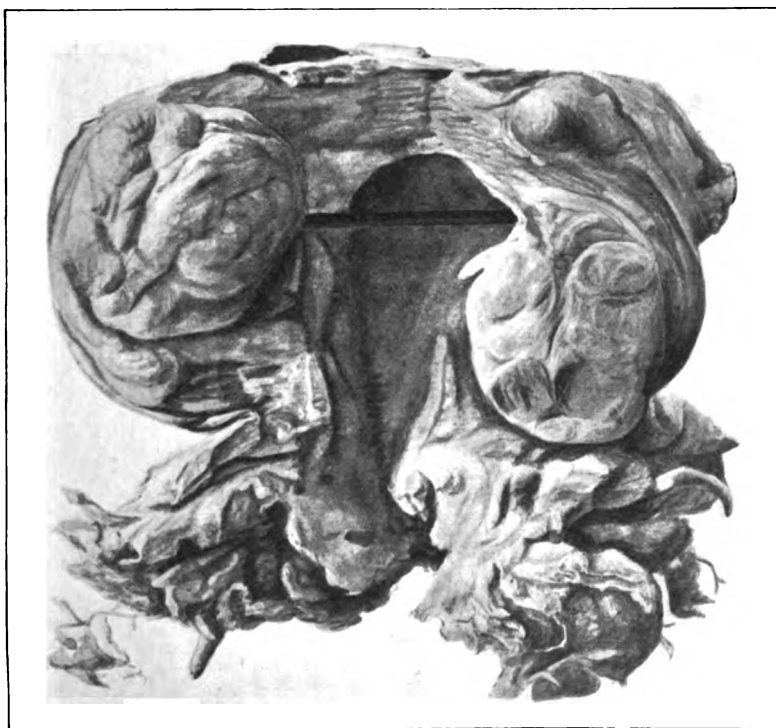


FIG. 22.—FIBROMYOMA UTERI WITH CARCINOMA OF THE CERVIX.
M. S., æt. 47. Ten children. Three miscarriages. Slight hæmorrhage 11 months before operation. Severe hæmorrhage 5 months before operation, followed by four more severe losses of blood. Continuous offensive brown discharge for 3½ months. Removal, Nov. 14, 1895. (Across widest part, 4½ inches.)

Fifthly, from suppuration, producing abscesses in the substance of the tumor.

Mention should also be made of a condition described by Mérière, **fibromitis**. This may be caused by exposure to cold or injury. It is, according to Macnaughton Jones, an interstitial inflammation of the tumor itself. There is local pain and tenderness, with general constitutional disturbance, and rapid enlargement of the tumor. It may end in resolution or in suppuration of the growth. It is, indeed, the early stage of necrosis.

CHAPTER VI.

THE RÔLE OF MEDICINE.

It must be admitted that it is difficult for anyone who wishes to get at the truth to estimate the value of the treatment of fibromyomata by medicine. Various writers extol the powers of various drugs in varying degree, and probably most general practitioners of any length of experience have determined for themselves what reliance they individually place on any one of them. There is a tendency on the part of those who recommend the use of a drug to emphasize only its good points, and we have to wait for the next writer with a penchant for a new drug to learn its drawbacks. Ergot has long had a great vogue in this disease. It is supposed to check the growth of these tumors by producing contraction of the vessels supplying them. Other writers consider that its great advantage consists in that it stimulates contraction of the uterine muscle, and thus squeezes interstitial tumors inwards or outwards according to the relative amount of muscular fibre which lies outside or inside any particular nodule. A fibroid tumor, however, is no less a fibroid when it is subserous or submucous than when it is interstitial, and each has its own peculiar dangers: thus, a subserous fibroid may by its position compress a ureter, a Fallopian tube, a portion of intestine, or may become impacted in Douglas' pouch. If its pedicle becomes elongated, it may by its movements excite very serious nervous phenomena; it may become adherent to other abdominal viscera and greatly impede their power of function. If submucous, it will greatly increase the loss of blood at and between the menstrual periods, whilst should it become pediculate, it may become sphacelated, and bring the patient to the point of death by sepsis; in any case, it will greatly increase her pain and loss of blood. In order to produce any effect at all ergot

must be continued for months,¹ and its prolonged use, according to Polk,² impairs digestion, interferes with cardiac action, deteriorates the general health, and produces mental depression. Moreover, it loses its effects after a time, whilst suspension of the drug is usually followed by a more or less rapid relapse into the previous condition. If we consider that patients afflicted with fibromyomata are constantly losing blood, and therefore need perfect digestion so that the loss may be as quickly as possible made up; that their hearts are prone to act irregularly simply because the amount of blood they contain is persistently below what is normal to them; that their general health is already below the average, because all their functions have to be carried on with a minimum of nutrient material; that their minds already tend to be depressed, partly because of the knowledge, so terrible to many, that they possess a tumor, and partly because of the forced abstention from healthful exercise that is inseparable from their condition, it would seem that the small good, if any, to be obtained from this drug is being purchased at an absurdly high rate; that, indeed, it is overwhelmed entirely by the definite harm done.

Polk mentions three cases in which ergot had been used steadily—in one case for three years—with no effect.

But it is necessary to consult the reports of lectures and journals of an early date to learn much of the drugs which were supposed to be useful in the treatment of fibromyomata. Journals and text-books of the present day are too fully occupied with the description of various operative procedures to be of much use for this purpose. It may, however, be stated that almost from the first fibrocystic growths were admittedly out of the power of control by medicine. Such tumors were looked upon with great dread, and were supposed to fill an intermediate place between innocent and malignant growths.

Meadows,³ in his lectures, describes such a case occurring in a woman twenty-six years of age, which recurred thrice. Hutchin-

¹ Hart and Barbour, p. 426.

² Med. News, N. Y., January 14, 1899.

³ Lancet, London, June 5, 1873.

son ¹ also relates such a case. It is probable that some of these cases were sarcomatous, since we find no description of that disease at that time.

In subperitoneal fibroids medicine is admittedly useless.

Looking through the older books, we find ergot, of course, pre-eminent. Chloride of calcium is greatly praised by McClintock, who records a case in which this drug was given perseveringly for two years, with the sequent disappearance of the tumor and arrest of hæmorrhage. Bromide of potassium, recommended by Sir J. Simpson; iodide of potassium; iodine, internally or applied to the cervix. Ethereal tincture of peracetate of iron, gallic acid, acetate of lead, salts of mercury. Ext. vinæ major liquidam, greatly praised by Meadows, which is curious, since I cannot find it in either the old or the new Pharmacopœia; and in Martindale it is mentioned as an astringent, which has been used for menorrhagia simply. Hydrastis canadensis, non-stimulating diet, abstinence from red meat, course of waters and baths at Kreuznach, Schwalbach, Horncastle, and Woodhall spas. Later, iodothyrene; thyroid extract; desiccated mammary gland; and, to relieve pain, conium, chloral, atropine, morphia, each in its turn has been recommended; and, with regard to most, cures—meaning thereby the disappearance of the tumor—have been claimed. Thus, McClintock claims a cure with chloride of calcium. Cases of polypoid extrusion and sloughing have been claimed as cures for ergot.² Engelmann ³ claims 18 per cent. complete cures, and 16 per cent. decided improvement, after using mother lye in baths at Kreuznach, along with compresses of the same diluted and kept on all night. Polk⁴ praises thyroid extract; Jouin ⁵ also. Lutaud ⁶ extols the action of iodothyrene. Finally, Reid, of Glasgow, and Shober recommend desiccated mammary gland.

¹ Med. Times and Gaz., June 20, 1859, p. 6929.

² Berl. klin. Wochenschr., October 6, 1879.

³ Edin. Med. Journ., November, 1896.

⁴ Med. News, N. Y., Jan. 14, 1899.

⁵ Journ. Med. Soc. London, October, 1896.

⁶ Journ. de Med., Par., March 20, 1897.

Idanko,¹ of Platsgorsk, recommends red hawthorn, and gives a case in which profuse flooding was completely checked by it.

Hach,² of Riga, used an American extract of *hydrastis canadensis* in 97 cases of uterine hæmorrhage, and obtained complete or partial success in 47. In 22 cases of uterine fibroid he got brilliant success in 8; partial in 14. He, however, saw cardiac palpitation in one case in a pregnant woman. Huebner also obtained satisfactory results in three cases of myoma. Von Strych, however, believes it produced abortion in one case.

More-Madden³ strongly advised ergot. "In some instances by long administration it produces a well-marked diminution in size." Iodide of potassium "in *suitable* cases, in *efficient* doses, and for a *sufficient length of time*, lessens the congestive hypertrophy which generally attends the development of these tumors." "In some instances we may possibly succeed in arresting the progress of the disease and prolonging the life of the patient by sending her to one of the iodated or bromated Spas."

But if we examine the cases of alleged cure brought forward, a great deal of the results claimed disappears. In those of most of the older writers, as, indeed, in those of later date, all that really appears to have happened is a more or less temporary check to the exhausting hæmorrhage and a certain decrease in size of certain tumors; in other cases, their expulsion after pediculation and often necrosis; in one or two, calcification of the tumor. It must be remembered that all of these results have also been noted as occurring spontaneously without the action of any drug in the life history of fibromyomata. Meadows noted that in the more quickly growing and more cellular fibroid there was a peculiar tendency to alterations in size, due, he believed, to a kind of œdematous infiltration, whilst we must all have seen cessations of hæmorrhage, lasting for a variable period, for which no obvious reason, certainly no effect of any drug, can be adduced. When medical treatment was all the physician had to rely upon, the relief of symptoms, even if

¹ Brit. Med. Journ., London, 1887, Vol. 2, p. 1121.

² Ibid., p. 1349.

³ Ibid., Vol. 1, p. 52.

only temporary, assumed disproportionate importance, and accordingly we find this or that drug lauded chiefly for its effect in controlling hæmorrhage or decreasing by ever so little, and for however short a time, its pressure upon parts around ; whilst the expulsion of a tumor by the natural passage was thought to be cheaply obtained at the cost of weeks of suffering and the narrowest possible escape of death by sepsis.

But if we compare various writers' opinions, we shall find a great number even of such results denied. Meadows, to whom I have already referred, says : " There is, in truth, no folly greater than to attempt the impossible, and no worse treatment of conscience and character than the habitual practice of unreality. .

. . I am firmly convinced that to persuade women for months and years to swallow gallons of medicine, mostly of a depressing and debilitating kind, in the vain hope that we can thereby bring about the absorption and removal of a hard fibroid tumor, . .

. . is not only unscientific, but unreal and dishonest. . . .

Of late years our knowledge of the action of many drugs has greatly increased ; and the clearer our insight becomes, the more completely does it dispose of the false reputation which has been dishonestly acquired by the remedies usually given in these cases."

Then he asks, how can bromide of potassium, known for its action on the nervous system, have the smallest influence in promoting the disintegration or absorption of a solid tumor? . . .

" Mercury, believed by some—I confess I am not of the number—to have the power of promoting the absorption of inflammatory products, what relation is there between this reputed property and the alleged power of absorbing the organised constituents of a solid fibroid tumor? I have used perseveringly the chlorides, iodides, and bromides of mercury, even to the maintenance of slight salivation, kept up for some time, but I must frankly own that beyond the mischief to the patient's constitutional powers, which they are well capable of inflicting, I have not observed any result, and most certainly I have never seen the very smallest diminution in the size of the growth. In iodide of potassium and iodide of iron I have just as little belief for the purpose in ques-

tion." Then he discusses the claims of chloride of calcium,—which has, he says, a most undeserved reputation,—and points out that the natural process of calcification, which it is desired to emulate, is a consequence and not a cause of a previous starvation of the tumor by diminution of its blood supply; and that, moreover, mere addition of lime to the patient's fluids by no means insures its deposition at any point at which we may desire it. "I believe," he says, "that drugs are utterly inert in promoting the removal of uterine fibroids."

Goodell¹ admits that very few typical and trustworthy cases have been reported of cures effected by internal remedies. He adds that he is anxious not to yield this point, since he is (1880) much against surgical measures,—and no wonder, seeing what were the results at that time,—so he explains the want of such cures by "the patient either gets disheartened and gives it up, or else goes from one physician to another."

Steavenson,² in 1887, advocating electricity, speaks of the uselessness of all medical treatment as a thing admitted.

Spencer Wells, 1888, says, in reference to Apostoli's treatment, that "he has so constantly to regret the inefficiency of medical treatment that he welcomes anything that offers a reasonable chance of success."

Hart and Barbour, 1882, say: "There is no medicine which acts immediately upon fibroid tumors so as to cause disintegration and absorption."

Lombe Atthill, 1885, says "that he has entirely lost faith in subcutaneous injections of ergotin."

Boldt, 1895, says: "All medicinal treatment is absolutely useless in pedunculated subserous tumors."

Penrose,³ 1898, says: "No drug has been discovered that has any influence upon the growth of the fibroid tumor."

Tait,⁴ 1885, says: "Medical treatment is a myth."

¹ "Lessons in Gynecology," 1880, p. 291.

² Brit. Med. Journ., Lond., 1887, Vol. 2, p. 704.

³ "Text-book of Diseases of Women," page 242.

⁴ Brit. Med. Journ., Lond., 1885, Vol. 1, p. 1203.

Mangin¹ has five cases. "Le traitement medical le donne aucun resultat." "Le traitement medical ameliore legèrement la situation." "Insucces des divers traitement medicaux." "Le traitement medical echoue," etc.

Boldt also remarks that "among the other remedies employed are potassium bromide and potassium iodide, arsenic, phosphorus, chloride of calcium, mercurials, etc. None of these, however, possess any positive therapeutic value. Various mineral and mud baths are of more or less benefit."

And of such baths, those of Kreuznach enjoyed, and still enjoy, the greatest reputation. As above stated, Engelmann, in 1892, claims 18 per cent. of cures from their use. Concerning these, in hunting up old journals, curiously enough, I came across other testimony, long since forgotten, I suppose. In the Medical Times and Gazette for 1857 there is amongst the hospital notes: "We are strongly advised to send our patients with uterine fibroids to drink the Kreuznach waters, to subject them to long courses of the iodides, the sal ammoniac, or the bromides. In relation to this question it may not be without interest to our readers to place on record the present opinions of the physicians who have respectively under their care two of the largest specialties for the diseases of women in the metropolis. On discharging a woman from his ward in St. Bartholomew's the other day, who had been under his care for a uterine fibrous tumor, Dr. West ordered that a course of bromide of potassium should be persevered with. At the same time he stated to his class that he had no expectation of benefit from it [shade of Alfred Meadows!], and was inclined to refer to erroneous observation the so much boasted cases of removal of fibrous tumors by medical treatment. He had tried the recommended remedies, and had sent some of his patients to try the Kreuznach waters. He had never in a single instance been able to note any positive decrease in size. Dr. Oldham, at Guy's, also stated positively that he did not believe in the possibility of the absorptive removal of such growths." A week or two later Sir

¹ Ann. de Gynéc., Feb., 1899.

Henry Thompson wrote to the same journal, saying that : " In the summer of 1854 I visited Kreuznach for the express purpose of obtaining information respecting the influence of these agents in these and similar hypertrophies. I was unhesitatingly assured by Dr. Prieger that he had no reason to believe that the Kreuznach waters, whether employed on the spot or elsewhere, exercised the power of removing undoubted fibrous tumor." So the efficacy of its waters was denied by its own high priest.

Steavenson ¹ later (1887) declared that visits to Kreuznach or Horncastle were useless.

Keith ² says : " I have never seen any permanent good come from repeated visits to the mineral watering-places that it has become a sort of routine treatment to send such patients to,—at least, not a greater improvement than might reasonably be accounted for by change of air, for nothing agrees so well with cases of fibroid as change of scene, especially if they are sent into hilly air." And, later, in 1891, he speaks of " the endless and useless visits to Kreuznach." " One lady," he says, " told us that her various visits there had cost her upwards of £700, and for all the benefit she had got she might as well have remained at home. The tumor and hæmorrhage went on in an increasing ratio."

Admitting the limitation that drugs are only useful in order to control the hæmorrhage, it is worth while to note what can be said for them in this relation ; and, to condense the subject, take ergot. " Ergot is our sheet anchor " (Goodell). I have already drawn attention to some of its drawbacks. To obviate these, such as disturbance of the digestive organs, if given for any period by the mouth, hypodermic injections of ergotin have been advised, and much stress has been laid upon the necessity for deep injections into the gluteal muscle, since, as Bumm ³ says, " abscesses are far less likely, and moreover, absorption requires 24–48 hours from connective tissue, whilst from muscle, it takes place in 12 hours."

¹ Brit. Med. Journ., Lond., 1887, Vol. 2, p. 720.

² Brit. Med. Journ., Lond., 1889, Vol. 1, p. 1282.

³ "Sajous' Annual," 1888, Vol. 4, p. 23.

Munde says: "The method is exceedingly tedious, and we cannot predicate, in any individual case, even palliation of the symptoms." It would, indeed, appear to be tedious, since Boldt says that "it may require 200 injections before any marked benefit is noticed, and in all probability from one to two thousand will be needed."

It is scarcely necessary to refer to the various hypnotics, conium, atropine, morphia, etc., since all that has been claimed for them was the power of relieving pain. This, of course, is granted; but with removal of the cause of pain, the need for these soon disappears, unless, indeed, the same tendency to procrastinate has induced in these sufferers the chloral or morphia habit; but a few words must be devoted to the claims of the new school of therapy, which has introduced thyroid extract, iodothyrene, and mammary gland, as remedies for this disease. Can they indeed do anything more than was accomplished by the older drugs? I think a critical examination of the cases brought forward shows unmistakably that they cannot. Thus, Jouin ¹ says that "thyroid feeding reduces the general bodily weight [surely this is not an advantage in these cases], causes a marked reduction in the size of uterine fibroids, while the symptoms, pain, pressure, general weakness, and especially hæmorrhage are certainly relieved." Lutaud ² says of iodothyrene that "women suffering from fibroids with hæmorrhage were always benefited, as the drug has an incontestable hæmostatic effect. Besides, even if the tumor itself is not diminished, the neighboring tissues are relieved of their congestion, the compression of the surrounding organs ceases, and their functions are more readily accomplished." The latter author gives three cases, in only one of which was there any alteration in size, and we know already that such alterations may occur without the use of any drug. The hæmorrhage alone was reduced. The use of these remedies, like that of older drugs, has its own particular dangers. Thus, in case one, a feeling of oppression and palpitation came on after nine days, necessitating the withdrawal of the drug; a burn-

¹ Journ. Med. Sci., October, 1896.

² Ann. Gyn. and Pæd., May, 1897.

ing sensation in the stomach and vertigo after food, nausea, and tachycardia were noted during its use in other cases. Ebstein¹ has seen palpitation, vertigo, anxiety, and glycosuria, as amongst its harmful effects.

In 1899 Shober,² at a meeting of the American Gynæcological Society, condemned thyroid extract for these results, adding to their list that of extreme nervous depression following its continued use. But, evidently feeling that if he removed one forlorn hope, he was bound to substitute another, he advocated the use of desiccated mammary gland, already suggested by Reid, of Glasgow. He gave special directions for its use, and, to disarm criticism, distinctly claimed for it that in the full dose it produced cramp-like contracting pains, which, he declared, were in the tumor itself, and were not stomach-ache. The discussion which followed was interesting, not to say amusing. Dr. Noble suggested that in the parallel suggestion of Dr. Shober, to give desiccated parotid gland for ovarian disease, the reason was that patients with mumps get ovaritis, and vice versa. Dr. Shober adopted this explanation as the *only* basis on which these preparations are used—and, whilst admitting that “we do not know the meaning of these things,” laid great emphasis on the fact that women who have disease of the thyroid gland invariably (?) suffer from menorrhagia, whilst involution of the uterus goes on during lactation, the period of chief activity of the mammary gland. But on reference to his paper it will be seen that the satisfactory results claimed are: Menstrual periods more regular and less profuse, little if any pain, lessening in size of the tumor; “to say the least, the patients have been placed in a far better condition for operation.”

At the Versaml. Deutsch. Naturf. in Vienna, September, 1899, Guerard showed an apparatus for the treatment of hæmorrhage arising from myomata—amongst other complaints—by the use of hot steam. The apparatus was designed by Pincus, and is so

¹ Deutsch. med. Wochenschr., Jan. 14, 1899.

² Am. Journ. Obstet., N. Y., February, 1899, p. 173.

arranged that whilst this application can be made to the uterine canal, the vagina and external parts are protected. It is, he says, mainly of use at or about the menopause. Old patients bear it better than younger ones. The temperature should range from 212° to 239° F., and the steam should be applied for ten to thirty seconds. If a repetition is necessary, it should not begin sooner than four weeks later. This plan he calls *zestocausis*. It is contraindicated in the presence of malignancy or of disease of the appendages.

But it is with these as with the older remedies. Hæmorrhage may be checked for a time, some diminution in the size of the tumor may occur,—whether caused by, or occurring during, their use, but essentially temporary,—but it is utterly futile to look for an eradication of the disease by their action.

As Tait long since pointed out, moreover, their good effects—if any occur—last only as long as they themselves are given. Hæmorrhage, for instance, if checked by ergot, bursts out again as profusely as ever soon after its cessation. The size of the tumor once more increases. In many cases, indeed, it appears to grow all the faster for the temporary check, and at last we are confronted by such cases as those described by Keith in his earlier work, cases in which the chances of operative success are reduced to their lowest point, not because of the inherent risk of the operation itself, but because of the insensate delay in *trying* things already proved to be useless, until by loss of blood, pressure on vital organs, mental distress, and all the other debilitating and exhausting factors which arise and combine during this wasted time, the patient is brought into a condition of utter exhaustion. Then, and then only, will some assent to the only thing which gives a certain result. Is it any wonder that the mortality of an operation is still higher than it should be?

Meanwhile, the powers of the patient are decreasing, her general health is deteriorating, she is wasting the prime of her life in a miserable existence, which is not unavoidable. She may be laying the foundation of a wretched morphia or chloral habit, she is running certain totally unnecessary risks, and she is rapidly discount-

ing her chances of a successful result when at last operation may be suggested.

It may be thought that in emphasizing the limitations of medical treatment at this date I am doing what is unnecessary ; but this is not so, as the practical experience of every practitioner will bear out. An examination of our text-books will also show that at the present time their use is still taught. Thus, Lewers, 1897 edition : "If bleeding is the chief symptom [in interstitial or subperitoneal fibroids], we should first try what rest in bed with large doses of ergot will do, preferably using ergotine, gr. ij-v in form of a pill, thrice daily. Hamamelis may also be tried, $\mathfrak{m}_{\text{v-x}}$ of the tincture three times a day, or hydrastis canadensis, \mathfrak{m}_{xx} of the tincture thrice daily, or the infusion of vinca major."

Galabin, 1893 edition, advises Woodhall Spa. Philips recommends ergot, potassium bromide, or subcutaneous ergotin, hydrastis canadensis, hamamelis, a visit to Kreuznach, Schwalbach, or Woodhall Spa.

Rosthorn,¹ of Gratz (1899), says : "When troubles are caused by pressure of the increasing tumor, by consequent changes in the adnexa, and perimetritic affections, most benefit is to be hoped for from the systematic use of baths, and brine baths are far better than peat."

Hart and Barbour, following Simpson, advise :

Ergotine,	3ij	
Aq.,	3vj	
Chloral hyd.,	3ss.	M.

$\mathfrak{m}_{\text{xij}}$, containing 3 grs., to be injected subcutaneously : to be continued for several months.

Hydrastis canadensis, $\mathfrak{m}_{\text{xv-5j}}$ of tincture, or up to 5iv of liquid extract. Bromide of potassium, non-stimulating diet, and a course of Kreuznach waters.

The word operation has even yet, in spite of anæsthesia and asepsis, such a dreadful sound in the ears of many patients that

¹ 8th Cong. Germ. Gynæc., Berl., 1899.

unless convinced of its utter futility they will continue to swallow "gallons of physic" rather than submit to surgical measures.

Prolonged medical treatment of fibromyoma with a view to radical cure is useless. It wastes time, permitting the occurrence of complications, which greatly increase the risk of subsequent intervention, and deludes the patient with illusive hopes of disappearance, which are inevitably doomed to disappointment. This, of course, does not imply that various drugs may not be temporarily used until operation is practicable. I simply protest against their use for any appreciable period of time. The same may be equally or even more strongly said of visits to various mineral springs—Kreuznach, Schwalbach, Horncastle, Woodhall Spa.

If a tumor is obviously increasing in size, with or without increasing loss of blood, surgical or electrical treatment is called for.

CHAPTER VII.

THE RÔLE OF ELECTRICITY.

In 1886, preceded by an enthusiastic series of articles from Dr. Woodham Webb in the *British Medical Journal*, Apostoli, of Paris, brought forward at the Dublin meeting of the British Medical Association the question of electrical treatment of fibroid disease of the uterus. Electricity had been used before in a more or less aimless fashion. Tait and Althaus had tried it in Birmingham, Cutter and Kimball in America, whilst Keith later gave a graphic picture of the way in which it had been used by Sir James Simpson in his younger days. Inasmuch as any scientific method of measuring the current was only possible just before the date of Apostoli's communication, these earlier attempts were necessarily destitute of any definite value. Althaus, indeed, used a galvanometer, but it was of the old useless pattern, imperfectly graduated, and neither he nor Tait ventured upon any certain statement as to the strength of the currents used. Simpson's method had no value at all, since the interrupted current only was applied by him, a current which could have no effect in the desired direction. Kimball and Cutter, by their use of sharpened directors as rheophores, which they thrust into the tumor by the nearest available route, whether through the abdomen, vagina, or even rectum, introduced so many additional and unnecessary risks that their results did not and could not apply to the careful and scientific application of the remedy as proposed and carried out by the French surgeon. Apostoli claimed to have treated 403 patients, with 2 deaths; to have effectually checked hæmorrhage, and to have produced a considerable decrease in the actual bulk of the tumors. Ninety-five per cent. of permanent benefit, he said, had been acknowledged. He did not claim, though some of his followers

did, the entire disappearance of fibromyomata. The technique he recommended is practically that used at present, and for the first time enabled the surgeon to use the continuous current with a clear idea of the amount and intensity employed. His method was enthusiastically welcomed by the elder Keith, Steavenson, Inglis Parsons, Playfair, and others in England, who went over to Paris to examine for themselves the patients referred to in the report; to see the instruments employed and the manner of their application; and they returned not much less enthusiastic than Apostoli himself. At last fibroid disease was to be absolutely under control; they had seen hæmorrhage checked, tumors decreased in size, the results of intra-pelvic pressure—difficult and painful micturition, defæcation, and locomotion, etc.—consequently relieved, and in many cases apparently abolished, and the effect was startling. Dr. Keith, who whilst in Edinburgh had succeeded in lowering the death-rate of hysterectomy below that of any other surgeon of that date, —viz., to 4 per cent.,—ceased abruptly to operate, and declared that it was a crime any longer to do so, until electricity had first been tried in any given case. He wrote with evident conviction, and his words carried great weight. Tait, almost alone, protested. The reports, he said, were not to be trusted; things were not so perfect as they were represented. Several cases submitted to electrolysis by competent men—even some who had been treated in this way by Keith himself—had found their way later to him, confessing that they were none the better, but rather worse, for the treatment. One case, which at first even he had been inclined to look upon as a success, had re-developed symptoms—hæmorrhage returned; the tumor, at first decreased in size, had started regrowth with increased vigor. How far he was biased by the fact that he had just succeeded in establishing an operation of his own—removal of the appendages—in surgical favor, must be left to individual judgment. Pathetically, he declared that we were all settling down so satisfactorily; we were all so nearly in accord as to the best method of treatment, when this Frenchman came along and “set us all by the ears.” Meanwhile, to support his objection, many cases of failure of the electric treatment were reported, and

several fatal cases. Apostoli himself had confessed to two, and to having "started or aggravated 10 cases of peri-uterine phlegmonous inflammation." Whether due to inexperience or carelessness, the fact remained that cases of salpingitis, pyosalpinx, and ovarian abscess had been overlooked, overshadowed by the presence of the large tumor, and electrical interference had caused these to increase; in some cases to give way, and to produce fatal general suppurative peritonitis. Several fibroids sloughed out under the use of the negative pole internally, and though some of these recovered completely, it was at the cost of weeks of suffering, and the concomitant daily risk of poisoning by sepsis. There was the inevitable rebound in professional opinion, and in 1890 Tait was able to say, in response to a letter from the younger Keith, that the latter was recommending a line of treatment in which nobody else believed. This was not altogether the case, however. Electrical treatment was, and is still, believed to have some place in the treatment of fibroids, though not at all to the same degree as Apostoli taught.

It is especially useful in cases where hæmorrhage is the chief symptom. It is absolutely useless, and may be very harmful, in cases of œdematous, calcareous, fibrocystic, sarcomatous, or necrobiotic fibromyoma, and in all cases where there is concomitant inflammatory disease of the appendage it should be absolutely forbidden.

The apparatus required consists of a battery, which should be capable of yielding ten volts. It must give a perfectly even current, without sudden alterations in force. Milne Murray estimated the bodily resistance as varying from 768 to 1200 ohms in different persons. Keith, however, found the highest resistance to be 350 ohms, and says that it diminishes with each application. It is greatly modified by using moist electrodes, by their position,—*i. e.*, whether applied to skin or mucous membrane,—and by their size.

The battery is connected with a commutator, by means of which sufficient resistance can be introduced into the circuit to reduce it to one milliampere, and which resistance can be very gradually

and evenly reduced, so as to permit a steadily increasing amount of current to pass, up to 300 ma., without sudden jerks or intermissions.

The commutator is connected in its turn with a galvanometer, graduated in milliamperes, from 1 to 300.

From the commutator pass two long, insulated wires, one attached to each pole.

The negative wire is connected with a large pad, wet with salt water, placed firmly against the patient's abdomen. Apostoli used sculptor's clay, in the centre of which a small metal plate was embedded, and to which the negative wire was attached. The clay pad was firmly pressed into all inequalities of the abdominal surface.

Aveling¹ used amadou instead of clay and a flat coil of copper wire instead of the metal plate. This was placed between the amadou and spongiopiline and the whole moistened with warm salt water. Later, he used a spiral metal ribbon instead of the coil.

The positive wire is attached to a uterine sound, the last four or five inches of which is made of platinum. The handle is of some non-conducting material, to protect the operator's hand, and the sound itself is insulated by a sheath which can be withdrawn or projected as far as may be desirable.

The vagina is carefully disinfected by douching, and the sound, forceps, and speculum are boiled or soaked in an antiseptic solution.

With the speculum the os uteri is exposed, and carefully cleansed by a pad of cotton-wool soaked in an antiseptic fluid. The sound is cautiously passed into the uterine canal as far as it will go without force, being previously bent into any direction which may be needed by the protrusion of the tumor, and the sheath pushed up until it rests upon the os. In this way the vagina is perfectly protected, and the action of the current confined to the endometrium. The speculum is removed. The two

¹ Brit. Med. Journ., Lond., Vol. 2, p. 1076.

rheophores being in place, the current is slowly turned on. Apostoli directed that it should be given thus: For first half-minute, 20 to 30 ma. Augment gradually to 78, 80, or 100 ma., and maintain at highest point four to ten minutes. Never cause more than an easily supportable amount of pain. At subsequent sittings 150, 200, or, if necessary, 250 ma. may be reached.

I have often found it unwise to attempt even 30 ma. during the first sitting. Many patients are very nervous, and anything like pain during the first time or two may easily frighten them away. Later, when they become accustomed to the process, much higher intensities may be reached. Keith noted also the great difference between the nervous excitable women of the south, and the hard, phlegmatic women treated in the Scotch Hospital. Allowance must be made for this difference in patients. Aveling never used more than 175 ma. Lucas-Championnière and Danion never used more than 65 ma.; usually, 45–55 ma.

The current should be decreased quite as steadily, though more rapidly. When the sound is removed, a second douche should be given. The patient should rest for a few hours afterwards, preferably in bed. No theatre, concert, or dinner should be attended on the same night. Cohabitation must be forbidden during the course of treatment. Sittings must vary with the object sought and the nature of the disease. Generally, they should be given twice a week. Keith, however, gave them every other day in some cases of insistent hæmorrhage. Inglis Parsons ¹ used 250 ma. for thirty minutes every other day without evil results. Tivy ² always waited for ten days between each séance.

The time over which treatment should be extended is somewhat indefinite. About thirty séances at one time appears to be the usual allowance. Then there should be a period during which no applications are made and the effect of what has been done should be watched. Keith said that, after treatment is stopped, there may in some cases be no apparent benefit and the amount of good done may not be apparent for several months.

¹ Brit. Med. Journ., London, 1888, Vol. 1, p. 799.

² Ibid., p. 1378.

Apostoli recommended puncture of the tumor from the vagina in cases where the bulk of the mass was the main cause of symptoms. He used then the negative pole intravaginally, but this plan is too surrounded by dangers to be advisable, and its use has, I believe, been definitely abandoned. Many cases of sloughing of the tumor, with sequent septicæmia, pyæmia, and death, have been reported as following this practice.

Keith, Apostoli, and others laid great stress upon the sense of general well-being which followed the use of electricity, and considered that it had a general tonic effect upon the system, apart from hæmostatic action.

Many evil results were reported by Tait, Martin, Mackenrodt, and others ; thus, the last two named authors reported 36 cases, of which 16 were distinctly made worse, and 3 died—one from pulmonary embolism, one from suppurative necrosis, one from peritonitis. Imlach reported a case of instantaneous collapse ; Gibbons, one from hæmorrhage, one from peritonitis. The great majority of such cases, however, appear to have been due either to a want of proper care on the part of the operator, or to its employment in cases which we now know are unfit, such as those complicated by pyosalpinx, etc.

To sum up : The use of the continuous current is admissible in certain cases where hæmorrhage is the principal symptom and where no contraindication exists.

1. It is useless in fibrocystic growths, in subperitoneal fibroids, or in polypi.

2. It is absolutely dangerous when there is any coexisting disease—especially inflammatory disease of the Fallopian tubes or ovaries ; and such concurrent disease is of frequent occurrence. Meredith's analysis of 147 cases operated upon by Tait showed 45 cases of pyosalpinx, 43 of chronic ovaritis, and 2 of ovarian abscess.¹

3. The introduction of the positive pole into the uterine canal, if it can be made to affect the whole endometrium, has a distinct

¹ Brit. Med. Journ., Lond., 1890, Vol. 1, p. 897.

hæmostatic effect, but it is doubtful whether this is greater than that which would be produced by any other cauterizing agent.

4. The internal use of the negative pole does, without doubt, produce a decrease in size of the hard multinodular fibroma, but this decrease does not always persist.

5. It is extremely rare for any myoma to entirely disappear under electrical treatment.

6. Puncture of the fibroid is always risky, sometimes disastrous, and the addition of an electrical current does not appear to greatly modify its effect.

7. In no case should electrical treatment be used except with the most careful precautions, both as to asepsis, and as to after-care to avoid chill. Keith himself gives an account of one patient he was forced to leave in Edinburgh when he himself went to London, who died suddenly apparently from this cause when everything was otherwise proceeding satisfactorily, and some other cases are on record.

The use of electricity holds a median position between that of medicine and that of surgical measures. It has the advantage that many do not shrink from its use, as they do from anything which may be called an operation; whilst undoubtedly in certain cases it does produce a definite and reliable effect. There are, however, well-defined limitations to its employment, it being entirely useless in certain cases and extremely dangerous in others. But when it can be given, and in suitable cases, it certainly has extremely good effects.

In cases of moderate and even profuse hæmorrhage, due to interstitial or submucous tumors which are not pedunculated, we can almost certainly reckon upon control of the bleeding and a return of the menses to the normal type. This is claimed by Apostoli, and his claim is justified by cases brought forward by Keith, Steavenson, Aveling, Inglis Parsons, Laphorne Smith, and Playfair.

The general health is wonderfully improved. This has been noted by almost all observers.

In many cases the tumors decrease in size; in some they almost disappear (Aveling, Keith, Playfair).

Per contra sometimes, for no definite reason, the treatment fails entirely.

Tait and Byers showed cases successful at first, followed by relapse.

We do not know that the effects produced will be permanent.

Without great care damage may be done which will render a succeeding operation more dangerous.

In many cases the treatment is tedious and appears to make matters worse ; Keith as well as others noticed this.

My own experience of this method confirms these conclusions. The following case is typical of my results :

Mrs. H., æt. 47, medium height, very stout, three children, no miscarriage, last child twenty-one years old. For last three years has noticed a gradual enlargement of abdomen. For last five years has had increased menstrual flow, which is now occurring every fourteen days ; there is difficulty in urination, with frequency ; some constipation. Constant current, with anode intra-uterine, beginning with 20 ma., ten minutes' séance. This is repeated in three days, the amount rising to 30 ma. With intervals, due to metrorrhagia, the séances are repeated every four or five days, the amount gradually rising to 120 ma. The hæmorrhage was controlled, gradually ceasing ; the periods had longer and longer intervals until the menopause, which occurred at 49. The tumor evidently somewhat diminished in size, the urination became less frequent, and the lips, which had been white, recovered their colour to some extent, but the patient never quite lost the sense of weight and fullness ; she was subject from time to time to attacks of breathlessness, gripping sensations, dyspepsia, and a general feeling of invalidism. As her symptoms are bearable, she will not consent to an operation, which might finally rid her of the cause of her trouble, nor do I now feel inclined to press it ; but, comparing the result and the time during which she suffered in order to obtain it with the quick and complete results obtainable in other ways, I cannot look upon this case as completely satisfactory, though doubtless it would be quoted as such by the supporters of electrical treatment ; and I believe it will be found to be typical of most of the results obtainable by that method.

Whilst, then, treatment by drugs is only useful as a temporary measure, the skilful use of electricity in certain cases is powerful for good ; and so long as it is not used in those cases which experience has shown are not affected by it, such as fibrocystic and sarcomatous tumors ; or those in which it is distinctly harmful, as in those complicated by salpingitis or ovaritis ; moreover, so long as its use does not blind patient and surgeon to the actual dangers of delay in cases which ultimately require operation, so long will it be one of the really effective weapons for use against the disease.

CHAPTER VIII.

GENERAL SURVEY OF SURGICAL TREATMENT.

Before entering upon the question of operative treatment of these growths, it is advisable to emphasize the fact that some cases of fibroids do not require any treatment at all. Such are only discovered by accident, lie quiescent for many years, and produce no symptoms of any moment. They are best treated by masterly inactivity. Fibromyomata may, indeed, almost be said either to require nothing or to require electrical or surgical interference.

Incidentally, it may be as well to refer to a sentimental objection sometimes brought forward against all operations of this kind, for to some minds it would appear that anything which definitely includes as a necessary consequence the inability to produce any more living children, as removal of the uterus or of the ovaries undoubtedly does, is wrong and unjustifiable. Kelly, in his "Operative Surgery," Vol. II, p. 519, reproduces a letter from a clergyman whom he describes as highly educated, which shows to what lengths men will go in condemning others to sufferings which they do not and cannot experience themselves. "The removal of the organs of motherhood," he says, "causes a serious obstacle to the affections due a wife!! For in depriving a woman of the possibility of children there is taken from the home the unifying power of parental love. . . . As a husband I believe that *neither lifelong helplessness nor anything short of impending death* justifies ovariectomy, if with the diseased organ or organs remaining there could be the *remotest reasonable* hope of children." The italics are mine. A strong protest should, I think, be made against such ideas. The relation of husband and wife is a partnership of soul and body, in which each partner is bound to do his or her utmost to protect, help, and cherish the other. It is not merely a connection which enables the male partner to exercise his

paternal love and pride. The loving, innocent maiden who trusts her whole future to the one man in all the world for her, the faithful, devoted wife who has helped her mate in all his troubles and disappointments, because she believes in him as the wisest, kindest, and best of men, deserves better and more unselfish treatment in her pain and misery than to be condemned to "lifelong helplessness" and anything "short of impending death," because her callous mate hopes to get another child out of her before, worn out and useless for such purposes, she succumbs to the exhaustion brought about by his unfeeling, obstinate denial to her of those resources of science which might have saved her from such a wretched fate.

Such a doctrine is worthy of the Turks, who install, I am told, as chief favourite in their harems the woman who is fortunate enough to bear them a son, and promptly depose her and substitute another when she fails in this her—in their eyes—chief end as a wife. In European history the most concrete example of this principle is that of the first Napoleon, who deposed the faithful comrade of many troublous years because she was not able, apparently, to provide him with a son. He married again, and succeeded in obtaining the long-wished-for heir to all his power; and what good it did him, or anyone else in the world, everyone knows.

But those who talk in this strain are scarcely worth the time expended in discussing the matter with them. To more Christian and rational people it may be pointed out that sterility, when it occurs, is usually the result of the disease itself; and that even when sterility is not absolute, the dangers of pregnancy, not only to the mother, but also to the wished-for child, are very great. (See Chap. I.) Moreover, as fibroids usually do not assume any great importance until after thirty, and as, if a woman marries, she usually marries before twenty-five, there has been time enough for the birth of two or more children, if she is likely to have any at all, before this question arises. It, therefore, sinks from the importance of "Shall this woman be deprived of the joys of motherhood?" to the very minor question, "Shall this family be further increased or not?" A very different thing.

I mention, also, but with more respect, an objection which is said to have a religious basis. This is the view held, I understand, by some Catholics. It is forbidden to resort, for the sake of avoiding pain and distress in this life, to anything which risks the shortening of that life. Pain is sent to us for a beneficial purpose. It is wrong to attempt to evade or escape it. All religious opinions must be treated with deference. But one would like to suggest that, if logically carried out, such a doctrine has curious results. A man breaks his leg, the bones do not unite, and require wiring together. Now, all operations involve some risk to life, and a surgeon would have as much difficulty in promising absolute safety in such a case as he would in hysterectomy at the present day and with our present knowledge. Is such a man always to live with a broken and useless leg, when, by accepting a certain risk, he may be soundly restored to a normal condition? But perhaps the argument of most force would be that it is not a question between risk and no risk. As I have already shown, there is considerable risk of a shortened life if things are let alone; in the old days the dangers of interference were no doubt much greater. To-day, with improved methods, the same disproportion by no means exists. A careful investigation, moreover, conclusively proves that though this may be the view held by certain members of the Catholic faith, it by no means represents the *authoritative* opinion of that Church, which is, indeed, directly adverse to it.

The history of surgery shows that it is a very living thing. Therefore, like all living things, it is progressive and governed by the laws of evolution; of course, to a great extent, also, its results are more or less personal, and depend upon the amount of skill, patience, attention to detail, and care peculiar to each operator; but, taken generally, it may be said to depend upon a process of evolution. Various discoveries have contributed greatly to its progress and to the importance attaching to particular points. Thus, before the discovery of anæsthetics, special attention was paid, and properly so, to rapidity in operative work. After its introduction this was no longer so imperative, and the ultimate

result of an operation assumed greater proportionate value. In the same way, before Lister's time, certain parts of the body were almost sacred from the surgeon's hand; if they were accidentally invaded, and disaster followed, such disaster was believed to be due to something inherent in the tissues themselves, and not in any way to the conduct of the operation. This was notably the case with any surgical work involving the peritoneum. Now we have learnt that in many cases the surgeon himself introduced, by means of his hands or his instruments, the cause of the fatality, which, without it, need not have followed from the operation itself.

The history of hysterectomy for fibroids is itself a striking example of evolution in a particular operation. When it appeared possible that the peritoneal cavity was not the dark cupboard of our surgical childhood, but might be entered with some safety if reasonable care were taken, it was approached at first with great caution. Two main diseases of intraperitoneal situation appealed for intervention. One was ovarian disease; the other, uterine fibromyoma. The former was necessarily fatal if let alone; the latter in many instances was not. The former was evidently the first to be attacked. A small opening was made, the tumor, a cyst, was tapped and drawn out, its narrow neck surrounded by a clamp, and the main bulk cut or burnt away. We dreaded secondary hæmorrhage, and dared not, therefore, allow the proximal end of the stump to return into the depths of the abdomen, necessitating, should such bleeding occur, a much larger opening, and probably a prolonged search for the retracted vessel. It was intended, indeed, that plastic union should be made between the stump and the abdominal wall, so that at all times any vessel might be under inspection and control. For a long time surgeons would go no further than this. There were many and obvious inconveniences inherent in this method, not the least of which were the almost certain production of post-operative hernia and the retention for some time of a certain though comparatively small amount of dead and decomposing matter in connection with a raw surface. As confidence increased these considerations gained in proportionate importance, whilst familiarity with methods of suture proportion-

ately lessened the dread of secondary hæmorrhage. At last, one bolder than the rest having securely ligatured the stump, dropped it, and closed the abdominal opening over it; in some trepidation, however, for who could say how the distal extremity might behave inside? Granted that the stump did not bleed, there was a portion of its tissue practically dead, since the ligature, if effective, must needs deprive it of all circulation. Outside it had putrified; would it do so within? Experience showed that it did not, and henceforward all ovarian pedicles were treated in this manner. The dread of secondary hæmorrhage was proved to have been fictitious; the risks of septic poisoning, secondary abscess around the stump, and consecutive hernia were now avoided.

The lessons thus learnt were yet to be applied to uterine fibromyoma, but the conditions here were somewhat different. Ovarian cystoma was a neoplasm with comparatively slender attachments within the pelvis, and such attachments were to a comparatively unimportant part—the broad ligament. Uterine fibromyoma had in the best cases a fairly broad attachment, and in the worst an extremely broad one. In these latter cases also the tumor was not free, but was embedded in the very tissues of an important organ, the uterus. In some cases, starting from the uterus, it burrowed beneath the peritoneum into the broad ligament on one or even on both sides. It might not even be one tumor—it was very frequently multiple—and each tumor was, as a rule, quite distinct from the rest, the only bond of connection being the uterus itself. Large vessels surrounded the mass to be removed. Its usual vessels were greatly enlarged. The tumors by their own bulk compressed the efferent veins, and behind the point of compression these became widened, enlarged, thickened, and varicose. If one was wounded, the whole field of operation was flooded by dark blood, which obscured its own point of exit. Attempts to secure the first opening often produced others, the vessels being so closely set. It was little wonder that, even with the knowledge as to the behaviour of the peritoneum gained in ovariectomy, surgeons were still disinclined to attack in any radical way so much more difficult and dangerous a problem. In proportion as these dangers loomed

large before them, the inherent dangers, discomforts, and miseries of those who had to bear this burden were minimised, and looked upon as, after all, of but little comparative importance. In proportion as these dangers have been proved to be avoidable, or controllable, such miseries tend to be appreciated in a higher degree.

It had long been noticed that at the menopause many of these tumors ceased to grow; that bleeding tended to decrease, until at last, though very late, such bleeding stopped altogether, whilst if this happened, the bulk of the tumor decreased. It was also known that after the menopause the ovaries and tubes atrophied. It occurred to Hegar and to Tait—as, no doubt, to others besides—that if the latter could be brought about by artificial means, as by their removal, an artificial menopause might be established, and the main difficulties—pressure from great size and anæmia from hæmorrhage—might thus be got rid of. Whoever should have the credit of the first idea, the credit of making this proceeding widely known and practised in England undoubtedly belongs to Tait. Tait¹ himself declares that the removal of cystic ovaries having produced in two or three cases the cessation of hæmorrhage from a coexisting fibroid uterus suggested this plan to him. To the surgical mind of that day it had many advantages. It could usually be practised through a small opening. Tait boasted that he never required more than two inches, and at that time the size of the opening was considered a most important matter. The vessels tied, moreover,—the ovarian,—were the same as in ovariectomy, and familiarity had bred a certain contempt for them. It was far otherwise with the dreaded uterines. When Tait published his first set of cases, in 1885,² the enthusiasm was great. It was evidently not absolutely necessary to remove the whole tumor or tumors. The main dangers could be evaded by a comparatively simple proceeding, and if, indeed, we could depend upon this operation to check the exhausting hæmorrhage, and to produce atrophy of the bulky mass itself, the whole problem was

¹ “Diseases of Women,” Vol. 1, p. 194.

² Brit. Med. Journ., London, 1885, Vol. 2.

solved. But could we? Tait himself, with all the enthusiasm which characterises the successful introducer of a new operation, was forced to admit that this proceeding was powerless in pedunculated subperitoneal growths, in fibrocystic growths, in degenerating fibroids, and in those which started or increased in size after the menopause. Moreover, that in some cases it was necessary to wait eighteen months or two years before the full result was obtained.

Some, like Orthmann,¹ found that bleeding was not very uncommon even after removal of the appendages. In two out of five cases total extirpation was, after all, required. Duncan² reported four cases in which hæmorrhage still continued.

Other operators did not obtain the successes that Tait claimed, and some noted that even if hæmorrhage ceased the bulk of the tumor remained the same, or even increased, with all the evil sequelæ which depended upon the presence of the tumor itself, hydro-ureter, hydro-nephrosis, pressure upon the bladder, rectum, nerves, etc., so that in such cases something more was required.

Besides, the proceeding itself was, after all, not so easy as at first it appeared. A myomatous uterus frequently rotates on its vertical axis, or on an oblique one, the degree of obliquity depending upon the deviation from symmetry produced by the eccentric position and development of the tumor. Many myomata are associated with some perimetritis or perisalpingitis. These two causes produced great difficulties. The first tube and ovary were often easily reached. They presented themselves, indeed, as soon as the abdomen was opened, but the second was buried down behind, firmly adhering to the pelvic tissues, and not to be reached by any means whatever short of the operation this proceeding was intended to avoid, that of hysterectomy. Another difficulty was also sometimes found. During the growth of the tumor the mesosalpinx was widely opened, and stretched, the tube and ovary were spread over the surface of the tumor or deeply buried in a sulcus

¹ Berl. klin. Wochenschr., Feb. 18, 1895.

² Brit. Med. Journ., London, 1894, Vol. 1, p. 1306.

between two enlarging tumors, so that what was often but a simple business became in such cases a prolonged, extremely difficult, and often very dangerous operation.

Knowsley Thornton¹ suggested that neither of the things before mentioned had any direct effect, but that the result depended upon shutting off one-third of the blood supply, and consequent nutrition of the growing mass, and those who hold this view point to the rapid increase in the size of myomata in those cases where pregnancy occurred, and there accrued in consequence an increased blood supply—with the parallel decrease in size after labour, when the circulation became lessened. If this were true, others, as Goelet,² argued, it would naturally be easier and more effective to shut off the blood passing through the uterine arteries, which might be reached from the vagina, and so any opening of the peritoneum be avoided. Two-thirds of the supply could thus be stopped, and the result should be quicker and more certain. Goelet³ and Martin,⁴ of Chicago, practised this, and obtained good results. Hartmann and Fredet⁵ also practised ligature of the uterine arteries, but from the abdominal side, reaching them from the ovarian fossa. But sometimes, especially in large tumors, the immediate deprivation of so large a proportion of the nutritive supply determined necrosis of the mass, and cases were reported in which the whole sloughed out, with all the attendant risks of septic infection during the process, to which not a few succumbed. It was evident that this latter method was only applicable to such cases as were not voluminous. In the majority of instances if the tumor was to be deprived of its blood supply, it was evident that it must also be removed at the same time.

Removal of the tumor did not always mean removal of the viscus in which it was embedded. If the tumor was single, or if there were but few, subserous and pedunculated, it was possible to remove them *per se* through an abdominal incision. The tumor

¹ Brit. Med. Journ., London, 1883, Vol. 2, p. 712.

² Am. Surg. Bull., June 1, 1894.

³ Ibid.

⁴ Am. Journ. Obst., N. Y., April, 1893.

⁵ Ann. de gynec., 1898, Vol. 49, p. 110.

was brought outside the abdomen through an opening just large enough to permit its exit, or enlarged sufficiently to permit of separation of any extra-uterine adhesions it might have formed ; it was removed, the pedicle tied and dropped. The uterus was allowed to fall back and the abdomen was closed. When myomata were subperitoneal, few, and sessile, the uterus was brought outside through a larger incision, a temporary ligature of rubber tubing placed around its base and held by forceps ; the outer wall of the uterus and the capsule of the tumor were vertically incised, the tumor shelled out, and the cavity left obliterated by deep continuous suture. Latterly, Alexander, of Liverpool,¹ has proposed to remove a large number of tumors in the same way through one median incision, temporarily uniting the edges of the uterine wound to those of the abdominal wall, and plugging with gauze, one end of which protrudes through the abdominal opening, and is gradually withdrawn. Engström² had previously advocated a similar procedure. He reports 100 cases with 5 deaths. In 37 cases there were multiple tumors (2 to 5) ; in one there were 22. In three cases growths redeveloped. It seems doubtful whether the fragmentary uterus remaining after the removal of a dozen fibroids of any size would be worth anything in future to its owner.

Nor was removal of a single tumor only carried out from the abdominal side. After dilatation of the cervical canal, polypoid myomata have been frequently removed from within the uterus. This is an old and comparatively simple procedure. The operation corresponding to the one just previously considered was that of removal of submucous tumors which projected into the uterine canal, but which were not pedunculated. At first, splitting the capsule by a vertical incision from within was done, ergot was given, and the extension of the tumor left to nature (Matthews Duncan³). Greenhalgh⁴ simply burnt a hole into it with the actual cautery. Such a proceeding involved all the old dangers

¹ Brit. Gynæc. Journ., London, May, 1898, p. 47.

² Monatsch. f. Geb. u. Gynäk., Bd. 5, Heft. 4, 1896.

³ Edin. Med. Journ., 1867, p. 713.

⁴ Med.-Chir. Trans., London, 1896.

so familiar to anyone who will trace the history of surgical interference in fibroid disease. Sloughing of the growth, with a period of great danger from septic infection, ensued. In addition, intense labour pains, great hæmorrhage, often death from exhaustion and sepsis, occasionally recovery as by a hair's-breadth escape. Pean recognised the weak point in this method, and robbed it of most of its terrors by following up the incision of the capsule by immediate morcellation and removal. It was curious to see how small a cavity was left after removal of a very large tumor in this way. The uterine fibres outside being situated in the very best position for contraction, once the dilating mass was gone closed up at once, and almost obliterated what had been an enormous gap. In one of my own cases a mass weighing over a pound left no space into which a gauze drain could be introduced.

Such an operation brings out curiously the personal element in the success of various operators. Thus, Knowsley Thornton¹ says he "never had the smallest anxiety after enucleation"; whilst Swain² says, "The mortality of enucleation is so great as hardly to be justified"; and Keith³ expresses it as "To my mind, the most difficult of all operations."

But after all cases capable of treatment in one of the ways already mentioned are eliminated, there remain a large number in which, either because of their rapidly increasing size; the number and wide distribution of the tumors themselves; the amount of blood lost, and increasingly lost at each successive period; the character of the tumor, sarcomatous or fibrocystic; the youth of the patient; the concurrent appendicial disease; the increasing interference with the surrounding viscera, or other reasons equally cogent, the only operation worth consideration will, and must be, one of entire removal; removal not only of the tumors, but of the organ containing them,—the uterus,—and the history of the present operations for that purpose is both interesting and instructive.

¹ Brit. Med. Journ., London, 1883, Vol. 2, p. 712.

² Ibid., 1884, Vol. 2, p. 119.

³ Brit. Med. Journ., London, 1894, Vol. 2, p. 119.

In 1879 Goodell¹ said: "In some otherwise hopeless cases the womb, together with its appendages, has been removed, but the mortality has been frightful." In 1878 Spencer Wells published his first list of cases. Of 24 patients, 15 died from three hours to fourteen days after—a mortality of 62.5 per cent. Keith,² in 1887, put the mortality at 25 per cent., "though it is probably much higher," and says "deliberately that hysterectomy has done more harm than good." The first method was precisely that first adopted for the removal of ovarian tumors, and it must be remembered that this is the operation to which Keith and Spencer Wells refer when they speak of hysterectomy. The tumors and uterus were drawn out of the abdomen, through a much larger incision in the anterior abdominal wall than that required for ovariectomy, since these tumors, being solid, could not be reduced by tapping; the bladder was stripped down, sometimes not sufficiently; and the pedicle, which consisted of cervix and broad ligaments on either side, with or without the appendages, was encircled at its narrowest part by a strong clamp, which was screwed up. Later, Kœberle brought forward a strong *serre-nœud* of wire, which constricted the pedicle. Bantock extolled the use of wire made of Delta metal, which was not acted upon by moisture. It is easy to understand that as either of these was tightened up it dragged strongly on the parts around, and if the bladder was not sufficiently freed, it might be dragged into and compressed by them, later ensuring the production of a vesical fistula at this point. This actually happened in some instances. Meredith, in a discussion at the Medical Society of London, in 1890, declares that the clamp had been finally abandoned in 1878, but I find many instances of its use at a much later date. Indeed, in this very discussion Skene Keith advocated it as indispensable in certain cases, whilst Tait, at the adjourned meeting, drew a graphic picture of the dangers to be feared from a stump abandoned in the peritoneal cavity, emphasizing more especially the risk of hæmorrhage. "A

¹ "Lessons in Gynæcology," p. 308

² Brit. Med. Journ., London, 1887, Vol. 2, p. 1257.

uterine stump," he said, "from which a myoma has been removed is unlike anything else in the human body known to me. It is as hard as cartilage—as brittle as cheese, so that a ligature will cut through it, or it is so completely infiltrated with serum that a tightened ligature will be quite loose in a few hours, and a vessel will bleed even at the end of forty-eight hours. After I had screwed up a Kœberle's clamp as tight as I could screw it, I have seen bleeding recur from the stump forty-eight hours later. In some of the cases, with specially œdematous pedicles, the compression of the stump has been followed by renewed tightening hour after hour, for two or three days after the operation. In such stumps large vessels sink back in the tissue and do not bleed at the time of operation; others, which do bleed at first, and were secured, will become loose. The best instrument is Kœberle's *serre-nœud*, and it is ridiculous to call this procedure barbarous." ¹

Grieg Smith said: "The intraperitoneal treatment of the stump was the operation of election, but there were undoubtedly cases—often the worst ones and those most justifying removal—in which this plan could not be carried out by any means that could be called good. If they could get the cervix completely free of muscular tissue, and well free of the ureters and bladder, and if the severed uterine canal could be covered with peritoneum, then the case might be treated on the intraperitoneal plan"; and in 1894 Bantock ² still advocated the extraperitoneal clamp method.

But if extraperitoneal treatment of an ovarian stump had disadvantages which ultimately were fatal to it, these disadvantages were fivefold intensified in the case of the uterine stump, and some other method was bound to come. It is necessary to remember, in considering and comparing rates of mortality, that when Spencer Wells, Keith (the elder), or Tait speak of hysterectomy, they mean this operation—now known as supra-vaginal hysterectomy, or amputation with extraperitoneal treatment of the stump. When the uterine cervix was drawn up to and fixed in the lower angle of the abdominal wound, the tension on the pelvic tissues was enor-

¹ Brit. Med. Journ., 1890, Vol. 1, p. 956.

² Lancet, London, 1894, Vol. 1.

mous. One observer, comparing a patient treated in this way with one operated on by the new method of extirpation, said of the former that she looked and moved in bed as if fixed down by a ton weight on the abdomen which rendered her almost helpless and motionless. The bladder was greatly compressed and dragged upon, so that catheterisation for many days afterwards was considered a normal condition. The mass outside and filling up the lower angle was three to eight times as thick as that of any ovarian pedicle. When it sloughed, as it was bound to do, the raw area exposed to absorption of putrilage was correspondingly large; and when the proximal end sank back, freed at last from the fixating pins, a larger, deeper gap ensued, and a proportionately greater risk of ventral hernia resulted. Abscesses around this stump were frequent. In one case when drainage also was used, on removal of the drainage-tube there spouted out great quantities of pus. In another, on the fourteenth day the patient died from the rupture of an abscess by the side of the pedicle.

Was it possible to emulate the ovariologists, and freeing once for all the cervix from the overgrown head, to secure its vessels and drop it to its normal level, closing the abdomen over it? Two things made such intending progressivists pause. One, as pointed out by Tait, was the fear of secondary hæmorrhage; but this difficulty might be surmounted. The other, and by far the most effective, was the risk of sepsis from the cervical canal itself. This canal communicated almost directly with the outer air; it opened directly into the vagina, a canal which most surgeons at that time looked upon as full of all uncleanness, and impossible to sterilize. And that this was a very real danger was evident from the records of several cases in which the remaining cervix had to be dilated in order to permit the escape of pus from the upper extremity of the stump.

At first the stump was transfixed and ligatured, its raw upper extremity being covered by peritoneum, which was sutured over it; then it was tied in sections; then the cervical canal was mopped out by carbolic acid, its mucous lining sutured above, and, the walls of the upper extremity being cut out in the form of a

wedge, these two flaps so formed were securely sutured together, so as to leave no dead space, and the peritoneum united over all. This not being satisfactory, the cervical mucosa was destroyed by Paquelin's or the electric cautery, and the upper extremity treated as before. In many cases, however, the sutures so uniting the upper flaps gave endless trouble, keeping up constant suppuration and requiring later removal. Byford,¹ having formed and ligatured the stump, made an opening behind or in front and forcibly inserted the upper extremity of the cervix into the vagina, so that both ends of the cervical canal opened into that passage, and closed the peritoneum over it. Le Bec left the cervix, but, after splitting it, he pared it down on both sides until only sufficient was left to give a firm grip to the ligatures previously placed on the outside. These were then drawn downwards into the vagina and the peritoneum was united above. Everyone appears to have clung with desperate earnestness to this lower segment of the uterus, and to have exhausted human ingenuity in its treatment before it occurred to anyone that it was possible to remove it entirely, and so get rid once and for all of all the annoyance it caused.

It is, curiously and appropriately enough, to a lady that we appear to owe this simple and effective procedure. Dr. Mary D. Jones, of America, in the *New York Medical Journal*, September, 1888, said apropos of a case in which she had performed extra-peritoneal fixation: "The pedicle or stump, which was secured with great difficulty, was so extremely short that it was necessary to make very considerable traction in order to get it into the abdominal wound; it was transfixed with pins and placed in the lower angle, the peritoneum brought closely up around it, etc. . . . The traction was so great that it made a considerable sink in the surface, and caused such pressure from the pins that, notwithstanding every care, and all possible disinfection beneath them, the skin was sore and ulcerated, and with all this there was the threatened danger of sepsis, abscess, etc., from the decaying stump. . . . What is the good of preserving the stump intra-

¹ *Am. Journ. Obst.*, N. Y., August, 1896.

or extra-peritoneally? It is only the remnant of a sickly wound, and can be of no service, and may do much damage, not only at the time of operation, but in the subsequent history of the patient. . . . In both methods of operation, intra- or extra-peritoneal, it is the stump that makes the difficulty. It is the source of most of the danger, and statistical history shows that the great mortality of this operation is due almost entirely to unfavourable conditions originated in or generated around the stump."

Martin, of Birmingham, says that Bardenhauer was the first to perform total abdominal hysterectomy for myoma, and that he recorded seven cases with six recoveries. In Great Britain, Jessett, of London, and Smyly, of Dublin, were the earliest to adopt it; Jessett performing his first operation in 1892. I think, however, that it is to Christopher Martin himself that the credit belongs of making the operation popular by the clear and succinct account, illustrated by diagrams of its various stages, given by him in a paper read before the Edinburgh Obstetrical Society in 1896.¹ He records in this paper six cases of myoma without a single death. In a later personal communication he has given me a list of 27 cases and one death, a mortality of 3.7 per cent.

Why were all surgeons so oblivious of this easy method of avoiding so many dangers? Like most simple things, after it is pointed out, it seems so self-evident that one wonders it was not done from the first. Mainly, I believe, the regular evolution of matters must be the explanation. The work was novel, only since Lister's time had it entered the stage of possibility. Each step was taken tentatively, and the knowledge gained by treatment of the ovarian pedicle was applied *pari passu* to the uterine one. Ovariectomy naturally stopped short at the intraperitoneal treatment of the pedicle; therefore all further progress must be original. But the natural conservatism of surgeons generally is answerable for much. Jones brought this forward in 1888. A. Martin began also, in 1888, to do a similar operation. Boldt described a combined method for total hysterectomy in 1893. Yet in 1894 we find one

¹ Birm. Med. Rev., 1896, p. 142.

surgeon ¹ still practising and preferring the extraperitoneal fixation, even in 1898 reporting 18 out of 32 cases treated in this way, whilst other surgeons, as Meredith, in 1890, Doran and Heywood Smith, ² in 1900, are extolling the intraperitoneal treatment of the stump as the ideal method. Knowsley Thornton, ³ in 1896, says the oldest peritoneal method with Kœberle's *serre-nœud* is probably by far the commonest procedure, and Malcolm, ⁴ in 1897, says it gives the patient a far better chance of recovery than any of the methods by which the abdomen is at once closed. Later, however, in the same paper, he mentions one case followed by acute obstruction; another requiring secondary operation for adhesion of the transverse colon to the stump; another with a coil of strangulated small intestine due to a band; another with yielding of tissues above the stump, escape of omentum, and death on the thirteenth day.

In France, according to Ricard, ⁵ both these methods have long been obsolete. Of the supra-vaginal amputation with external fixation of the stump, he says, indeed: "When one recalls the details of this so primitive a technique, it would seem as though we had returned to the barbarous methods of the earliest times of surgery"; and "nothing in this technique should satisfy a truly surgical mind." Of the same operation with internal treatment of the pedicle, he remarks that "the immediate and consecutive operative complications were so grave and so numerous that its abandonment was imperative." In saying this, however, he obviously refers to the earlier methods, in which the upper part of the pedicle was strangulated by a ligature which encircled it; since he goes on to describe a modified form, which is evidently the same as that of Le Bec, and which he calls "*hystérectomie sub-totale*," in which, after supra-vaginal amputation of the main mass, the cervix is cut through downwards by two incisions, the central section removed, and the two sides, being thus left thin

¹ Brit. Gynæc. Journ., London, August, 1898, p. 164.

² Private letter. See Chapter on Final Results.

³ Allbutt and Playfair, p. 628.

⁴ Lancet, London, 1897, Vol. 2, p. 971.

⁵ 13th Cong. français de Chir., 1899.

and moveable, are united by sutures. Over this, the interior and posterior peritoneal flaps are brought together by an overlapping stitch. The mortality of this procedure he gives as 4.5 per cent., based upon the results of 232 cases. As against this, he estimates the mortality of total abdominal hysterectomy at 9.65 per cent., and that of the combined method as 16.66 per cent.; whilst in England, even yet, some operators still advise the external fixation of the stump after amputation in cases where haste is necessary, cases of great anæmia from precedent hæmorrhage, collapse under chloroform, etc.

It will be noted that the earliest and latest attempts to deal with the cervix thus left *in situ* have one marked difference, in that at first the whole upper surface was ligatured, so producing a layer of tissue which was constricted and absolutely deprived of all circulation. In the second, the vessels at each side were alone tied, and no part of the cervical tissue was left in the grip of a ligature. This was certainly a great advance; and some surgeons, as Baldy,¹ Abel, and Zweifel, for instance, still advise the retention of some portion of the cervix, for the following reasons:

1. It is believed that total removal of the uterus necessarily involves the production of ovarian atrophy within a short period (two or three years), whilst the retention of even a small amount of uterine tissue avoids this.

2. It exposes less connective tissue.

3. It renders the operation shorter.

4. The anatomical relations of the vaginal vault are better preserved.

5. The vagina is not shortened or contracted.

6. One avoids hæmorrhage from the recurrent lateral and posterior arteries (Carstens).

7. The danger of wounding the ureters is less.

Side by side with total hysterectomy by the abdominal route was developing another operation, that of vaginal hysterectomy. First performed by Sautier, of Constance, in 1822, and again by

¹ Ann. de Gynéc., Par., Sept., 1899, p. 141.

Recamier, in 1839, it was accompanied by so high a mortality that it fell into abeyance. With the introduction of Listerism it was again brought forward by Czerny. At a discussion in the Surgical Society of Paris in 1888, Verneuil opposed it strongly. Richelot advocated it, and in 1891 presented to the same society 25 cases operated in this way for carcinoma, with 10 relapses and 15 without relapse. In 1892 he reported 134 operations for lesions other than cancer, with 9 deaths, a mortality of 6.7 per cent. Segond, 102; mortality 10.7 per cent. Pean, 90; mortality 1.11 per cent. In 1894 Jacobs, 106; mortality 2.4 per cent. Pozzi, 14; with no mortality at all.

In 1888 Murphy,¹ of Sunderland, brought before the British Gynæcological Society a uterus removed by vaginal hysterectomy with pressure forceps, after Pean's method; its reception was not favourable. Dr. Bantock said that the operation was one of unexampled severity. It was not likely to become popular in this country. Dr. Routh said the operation recommended had no advantages over abdominal section. To hear the case was to condemn it.

It will be noted that at first operators began by removing the ovaries and tubes, at the same time saving the uterus. Now we remove the uterus, and if possible save the tubes, and, above all, the ovaries. What is the meaning of this *volte face*? It must not be imagined that any but the most cogent reasons would account for such an inversion of principles.

In the earlier state of things, whilst fully realising how much would be gained if they could safely remove the bulky mass itself, surgeons were powerless to do so with anything approaching safety, since the way of so doing was not yet clear. Yet the condition required, as I have shown, some remedy. Medicine was useless. Accident showed that removal of the ovaries and tubes did often absolutely stop the hæmorrhage, which was bringing the patient to the point of death. Now that removal of the uterus was shown to be practicable, why do we save the ovaries whenever possible?

¹ Brit. Med. Journ., London, 1888, Vol. 2, p. 79.

It has already been observed that in a certain percentage of cases of fibroid disease one or both tubes and ovaries are so diseased as to be a menace to the life and health of the patients themselves, and therefore requiring ablation; but in all cases where they are healthy, surgeons generally carefully preserve them. Why? When the uterus is gone, what purpose can they serve? For a long time, following Brown-Séquard's teaching, it has been believed that every ductless gland gives to the blood a certain useful principle, the absence of which induces various diseases, or which, when present, exercises some important influence on the metabolism of the tissues. A marked example is seen in cachexia strumipriva, which occurs after removal of the thyroid gland, and is again held in check by thyroid feeding. Similarly, it has been noted that after ovarian removal, during the period in which these organs are normally active, various disagreeable symptoms arise. Dunn,¹ from observations made upon 100 cases operated upon in Paris, found that 78 per cent. suffered from a notable loss of memory; 60 per cent. from flushes and vertigo; 42 per cent. suffered from mental depression, and 10 per cent. verged upon melancholia; 25 per cent. had severe headaches, as a rule, increased in intensity at the menstrual period. These troubles were most marked in women under thirty-five years of age. Christopher Martin,² of Birmingham, mentions as results: Absolute sterility; cessation of menstruation in about 95 per cent.; atrophy of uterus, and, to a less extent, of vagina and vulva; abrupt and violent appearance of nervous phenomena, heats and flushes, perspirations, palpitations, giddiness, depression, and a generally unstable mental condition in a considerable majority; diminution or total abolition of sexual instincts, and a tendency to obesity. None of these symptoms appear, he says, if even only a portion of one ovary be retained. Bland Sutton gives similar reasons for retaining the ovaries if functionally active. Curatulo³ says: "The ablation of the ovaries exercises a considerable influ-

¹ Trans. Am. Ass. Obst. and Gynæc., August, 1897.

² Lancet, London, August 27, 1898.

³ Il Policlin. Roma, May 1, 1895.

ence on metabolism. These glands continually throw into the blood a peculiar product the chemical composition of which is unknown and the essential properties of which tend to favour the oxidation of phosphorised organic substances, of carbohydrates, and of fatty substances." A Martin,¹ of Berlin, says: "It is probable that the ovaries, like the liver and thyroid gland, modify the blood circulating through them, and add to the blood some peculiar product of their metabolism. It may be that some of the climacteric symptoms may be due to the loss of this substance from the system." It must be admitted that these are but opinions, but additional force has been given to them by the discovery by Schreiner of a substance which he has called spermin, which can be isolated from the thyroid and thymus glands, the spleen, the ovaries, the testes, and the blood. This appears to be an active oxidising agent, restoring by catalytic action the oxidising power of the blood. Poehl² says: "It acts as a physiological tonic, and increases the excretion of nitrogen by the kidneys."

Hirsch says that "it controls the metabolism of intraorganic oxidation, and, by the removal of accumulated waste products, disencumbers the nervous system, and so favours the *vis medicatrix nature*."

Chrobak's observations of women who had undergone the operation of removal of the ovaries, and who, in consequence, were suffering from what may be called acute traumatic menopause, also confirm this idea. By feeding them with tabloids made of desiccated and compressed cow's ovaries, all were relieved of their symptoms, and some were cured.

The present methods which aim at removing the uterus alone are therefore justified, in that:

(a) They at once remove the source of pressure on surrounding viscera.

(b) They definitely and immediately control the debilitating hæmorrhage.

¹ Samml. klin. Vortr., Leipzig, 1889, p. 2481.

² Berl. klin. Wochenschr., September 4, 1893.

(c) By removing the tumor or tumors themselves, they avoid the possibility of sequent sloughing or degeneration, with the risks of sepsis on the one hand and generalisation on the other; and

(d) They do not bring about an acute physiological menopause, with its train of nervous disorders. (See Kelly's list.¹)

At the present, then, there are four main operations which surgery offers for the definite cure of uterine myoma: Enucleation, or myomectomy, which may be either vaginal or abdominal; abdominal hysterectomy, or pan-hysterectomy, as it is called; vaginal hysterectomy, with or without morcellation, and a combination of the two routes.

If myomectomy—by which is meant the removal of the tumor *per se*, leaving the uterus and all the organs *in situ*—can be done, it is, theoretically, without any question the operation of election. The guiding principle of all truly progressive surgery is conservation—conservation not only of all healthy tissues, but of all structures which can be restored to health. At the same time, true conservation means the quickest and most complete restoration to health, and that is not attained by leaving within the abdomen structures which are utterly ruined, and which will inevitably require a second operation in order to remove them; which, whilst they remain, are a source of constant pain and chronic invalidism, only to be terminated by another risk; and which constitute, moreover, whilst they remain a distinct menace to life from septic changes. Such a ruined, painful, dangerous mass is a uterus from which several tumors have been removed. There are great dangers within a short time after the operation—danger of secondary hæmorrhage; of pent-up decomposing secretions in the cavities left, especially if the uterine canal has been opened; and of adhesions to the structures around, with their train of evil results, intestinal obstruction, contractions compressing ureters, vessels, and nerves. Later, there is the danger of formation of fresh tumors, or the development of others too small to be detected at the first operation. With our present incomplete knowledge as to the

¹ Brit. Med. Journ., Jan. 29, 1898.

etiology of fibromyomata, it is manifestly impossible for anyone to guarantee against this latter possibility ; and, lastly, there is the absolute certainty, should such a second operation be required, that it will be infinitely more difficult, dangerous, and generally unsatisfactory than a neat and complete primary removal of the affected uterus. It is evident, therefore, that the scope of myomectomy must be somewhat rigidly restricted ; each surgeon must be the judge of how far he may justifiably go. His personal skill and experience count for very much, but the accumulated experience of many operators shows, I think, that it will be wise to limit this operation to evidently single, or, at most, double tumors, and that these should not be associated with inflammatory diseases of the appendages. Tait limited it entirely to the adenomatous submucous myoma, which is always single, and which, when removed, does not recur ; and in this, I conceive, he was right.

The choice of one or the other of the remaining operations mainly depends on the size of the mass found. Both these have modifications. Thus, abdominal hysterectomy is practised according to the methods of Hegar, Schroeder, Baer of Philadelphia, Schauta, Le Bec, Martin of Berlin, Martin of Birmingham, Gow of London, Kelly of Baltimore, Jacobs of Brussels, Doyen and Richelot of Paris.

The combined operation may be begun from above, as Penrose and Donald advise, or from below, as Boldt, Wathen, Delageniere, and I have described it. There appear to be great advantages in the latter plan, for the following reasons : The patients requiring this modification are such as possess at once a large tumor and usually some disease of one or both of the appendages, with the consequent adhesions to parts around. They are anæmic, emaciated, and ill calculated to bear an unduly prolonged operation, or any unnecessary loss of blood.

By tying the uterine arteries first, the later steps of the operation are rendered almost bloodless, since there is usually but little difficulty in securing the ovarian arteries promptly during the abdominal stage. Dividing the vaginal attachments, separating off the bladder, and freeing the lower portions of the broad ligaments

are all easily and quickly done from the vagina, but are often extremely tedious and difficult—the most difficult stage of all, in fact—when done from above. When this is done, adhesions and diseased appendages are most satisfactorily dealt with from above, where their relations can plainly be seen.

Those who advise the contrary plan lay stress upon the possibility of septic infection carried by the surgeon's hands from the vagina into the abdominal cavity, but this is a relic of the days when it was considered impossible to sterilize the vagina. Of course, to make doubly sure, it is advisable for the surgeon to sterilize his hands again, after finishing the vaginal stage; but this can easily be done whilst the patient is being shifted from the lithotomy into the Trendelenburg position.

Moreover, if the tumor is large, and the first part is done from above, the cervix alone must be left for removal from below, and this necessitates amputation above, with ligature or clamping of the divided uterine arteries. If they are clamped, the clamps obstruct easy removal *per vaginam*. If ligatured, the work is duplicated, since they must be tied again at a lower level when the cervix is taken away.

Doyen's method from above with Landau's from below have greatly decreased the number of cases requiring the combined method, but occasionally it is needed, and is then extremely useful.

Vaginal hysterectomy may be done by Pean's, Doyen's, Pozzi's, or Landau's method, and either of these may be done with or without morcellation.

There appears to be no doubt that, whenever practicable, the vaginal route is to be preferred. Its mortality is certainly the least, but how far this is due to the fact that only tumors of moderate size can be treated by this method may be doubtful. Its exponents claim for it that shock is much less—indeed, absent (Donald,¹ Landau²); that there is less risk of septic peritonitis, better control of oozing, and a more simple procedure, all of which no doubt tell in helping to keep the mortality low. The other advantages claimed for it, the avoidance of an abdominal scar and

¹ Brit. Med. Journ., London, September 17, 1898.

² "Vaginal Radical Operation," p. 26.

of hernia, are not of so much importance now, with the improved technique of abdominal cœliotomy, whilst the latter, which Landau claims has never been observed after the vaginal operation, I find has been noted by Baldy¹ and Ferguson.² Byron Robinson³ has noted partial vaginal prolapse.

On the other hand, Coe⁴ reports two cases in his own practice, and eight in that of others, of adhesion of a loop of intestine to the edges of the vaginal wound, all proving fatal; while Reichel⁵ reports three cases of adhesions, which also died. Other single cases are reported by Bokelmann, Leopold, and Landau, death in each case. Giresse⁶ mentions other cases, and advises the formation of a vaginal anus should this accident occur. Such deaths, however, appear to be easily preventable by union of the anterior and posterior peritoneal flaps in the last stage of the operation.

Mangiagalli⁷ thinks the statistics of the two operations, abdominal and vaginal, cannot be compared, since the danger greatly depends upon the size and position of tumors; the prognosis is, *ceteris paribus*, very much worse in intra-ligamentous growths. These, and the larger tumors, should be attacked from the abdominal side. Vaginal hysterectomy did not give good results if the volume of the tumor exceeded that of the pregnant uterus at four months.

Alban Doran, in a recent private letter, says, very justly: "A true survey of such a series from statistics alone is impossible, as in several [of his cases] the tumor was very large, but no adhesions, and no inflammatory disease of the appendages, complicate the case; in others the tumor was smaller, but pyosalpinx existed; in several the patient was already anæmic from bleeding; in two there was partial sloughing; and in two, though the tumor was small, the cervix was invaded."

In chapter X the technique of each of the operations referred to is given in full.

¹ Am. Journ. Obst., N. Y., 1897, Vol. 1, p. 81.

² Ibid., April, 1897, p. 890.

³ Am. Gynæc. Journ., October, 1897.

⁴ Am. Journ. Obst., N. Y., Vol. 23.

⁵ Ztschr. f. Geburtsh. u. Gynäk., Stuttgart, Bd. 15, Heft 1.

⁶ Thèse de Paris, 1896.

⁷ Lancet, London, 1894, Vol. 1, p. 85.

CHAPTER IX.

PREPARATION FOR OPERATION.

Success in operative work of this kind depends greatly upon adequate preparation. This will affect the patient herself, the surgeon, the place in which the operation is to be performed, the instruments, the materials used for dressings, etc.

The Patient.—With the exception of such symptoms as those incidental to the tumor itself, there should be, if possible, no evidence of other disease. Inasmuch as these tumors are of slow growth, there is always time, should the surgeon see the case fairly early, to eliminate temporary complaints, such as influenza, bronchitis, gastric catarrh, etc. All these are certain to produce cough, sickness, or straining, and should especially be previously cleared away. There is sufficient tendency in this direction after anaesthesia, coupled with the irritation to the sympathetic system of nerves inevitable in operations of this kind, without any extraneous cause; moreover, the exposure during the time the patient is on the table, should slight bronchitis be present, may be sufficient to render it acute, or to develop pneumonia or pleurisy. Patients who have once made up their minds to operation are apt to be impatient of delay, sometimes for pecuniary reasons, and to demand immediate work; but, in their own interests, the surgeon should be firm in his refusal until all such symptoms have disappeared. The first five days after a hysterectomy are the most important. During this time, should the parts be roughly jerked by irritating cough or persistent vomiting, ligatures may be loosened, entailing concealed consecutive or secondary hæmorrhage. There will be loss of sleep and depression of vital resistance, or even, as I have seen in one case, rupture of the abdominal wound and escape of the intestine, necessitating further surgical interference, which the patient may

not be able to bear. For reasons which are obvious, all infectious diseases must be absent.

Into the state of all functions careful inquiry must be made. Cardiac disease of the kind usually met with in these cases is best prevented by early recourse to surgical measures. Should it exist, though not an absolute bar to operation, a very careful anæsthetist must be chosen, and he should be previously warned of the fact. The state of the heart is frequently directly due to the persistent losses of blood produced by the tumor, or to the actual pressure of the mass; and removal may be the only way in which this can be remedied. Personally, unless cardiac disease is very advanced, I am in the habit of relying greatly upon the skill of the anæsthetist, and have as yet seen no reason to regret doing so. I have had no deaths from this cause, nor can I find one recorded. Cardiac failure appears once in Dr. Cullingworth's lists of 90 cases, but this was after ablation of a tumor weighing $34\frac{1}{2}$ pounds, and may very well be due to the mere alteration in blood pressure consequent upon removal of such a mass. Albuminuria, as has been shown, does not always mean organic renal disease. It may be due simply to the presence of the growth, and disappears as soon as this has been taken away. I look upon it rather as a reason for early operation than as a bar to this. The presence of pus or casts in the urine, however, should direct particular attention to the urinary system, and all necessary measures should be taken to allay any acute affection before work is begun. I have already referred to the state of the lungs and digestive organs.

Patients should, if possible, remain in bed for a few days previous to operation. A woman who takes to bed for the first time the night before operation, especially if in a strange bed, will be far more restless during the first few days afterwards than one who has been recumbent for a week. Fortunately, most of those who suffer from fibromyomata have been forced to lie for varying periods, in consequence of pain or hæmorrhage, and consequently take more kindly to continuous recumbency than those suffering from many other disorders. On the morning of the day before operation purgation of the woman must be commenced. Such a

measure is vital to success. The intestines should be empty, for the following reasons: The primary danger we have to fear is peritonitis. No one can feel absolutely certain that, during the time the peritoneum is open, no micro-organisms can possibly have obtained admittance. The surgeon does everything in his power to limit the number of these, and Clark ¹ has abundantly shown that the serous membrane is capable of disposing of a small number, if quickly taken up, before they have time to develop and breed. The intestine, if active, acts as an elongated sponge, permeating the entire reclosed peritoneal sac, and, with the aid of the parietal peritoneum, carrying away into the circulation, where they are subjected to the action of phagocytes, any stray organisms which may have escaped our vigilance. But if the large intestine is full of hard, inspissated fæces, the small intestine is retarded in its attempts to empty itself; it remains quiescent, the pumping action of peristalsis is wanting, and the micro-organisms, allowed to remain in peace, propagate themselves at a tremendous rate, so that, when once absorption is again started, the system has no longer to deal with a few isolated germs, but with thousands, and septicæmia is almost the inevitable consequence. If the patient's powers of resistance are weak, if the peritoneum has been much damaged, or the relations between seed and soil are favourable, peritonitis may develop; and in either case the poisonous material may produce a local paralysis of the intestine, which subsequent purgation may be powerless to overcome. For the same reasons it is imperative that evidence of the vitality and patency of the bowel should be obtained as soon as practicable after the operation. Free movement of the intestines may be, indeed, almost looked upon as the key to success, and all abdominal surgeons await with considerable anxiety the first passage of flatus, and begin to feel safe after that has occurred. An intestine which is clear and empty before operation is far more easily roused to renewed activity than one loaded with excreta. It is but another exemplification of the old experiment on muscle fibre. Muscle

¹ Amer. Journ. Obstet., 1897, Vol. 1, p. 482.

will contract more quickly and with far more ease under stimulation when bearing no weight. At the same time there seems to be no object to gain by over-purgation. Nelson¹ advises the giving of mercurials until the stools show a yellow or green color. Byford² says the patient should have at least eight or ten movements the day before operation. It would seem quite within the range of possibility to exhaust the contractile force of the intestinal walls, or to produce a condition of asthenic irritability, both of which results would be equally harmful.

The external skin and vaginal mucous membrane, which may require division, must both be previously prepared. It is no answer to this that absolute asepsis of either is impossible. There is no doubt that, after all is done that can be done without destroying the tissues, organisms may still exist in the sebaceous, sudoriparous, or vaginal gland ducts. The object of the surgeon is to limit their number as far as possible, not to exterminate them altogether, since that has been shown to be impracticable. The patient's own phagocytes, as Metschnikoff has demonstrated, count for a good deal. What we have to do is to see that they are not overwhelmed by a force too great for them to overcome. There are various ways of doing this. The following has been adopted by the author for the reasons to be given :

The Skin.—Any hair is removed by shaving. All coarse dirt is washed away by soap, warm water, and a small flesh brush. I prefer to use Johnston's antiseptic soap ; the American surgeons seem to prefer green soap ; some others advise soft soap ; but I do not think that there is any great importance in the point. Any soap will do for this purpose. After the outer surface is cleansed, the really difficult problem is how best to clear the numerous skin ducts. A compress of lint soaked in hot water and glycerine, 1 : 100, and covered with some impermeable material is now applied, in order to soften and loosen all old epithelium. This is left on for six hours, and, when reinoved, a great deal of softened scurf, with the epithelium around and dipping into the duct orifices,

¹ Amer. Journ. Obstet., N. Y., 1893, Vol. 1, p. 293.

² Ibid., p. 284.

can be cleared away with the flesh brush. (Flesh brushes should be boiled or steamed before use.) With this goes, of course, a great majority of the micro-organisms present. Some, however, may still be presumed to lie embedded in the deeper epithelium and protected by the fatty contents of the sebaceous follicles. Something is required to dissolve out this fatty material and to attack the organisms. The surface is washed with æther; if there is any reason to suspect contact with specially infective material, first with turpentine, and this is followed by a spirituous solution, 1 : 500, of biniodide of mercury. The latter is scrubbed into the follicles. In this way the antiseptic biniodide, which Lockwood has shown to be the most reliable, is brought into immediate contact with the germs it is to destroy. If the spirit were left, however, in contact for any time, the skin would become hard, irritable, and raw from its action and that of the flesh brush combined; so, after waiting for a few minutes, the spirit is washed away by a watery solution of the same salt, which leaves the parts in a soft, unirritated, and supple condition. A fresh compress is arranged, mainly now as a protection. This is finally removed when the patient is on the table. Since, however, it may still further have loosened more epithelium, the parts are well sponged with an antiseptic just before commencing.

The Vagina.—As this is only a potential cavity, and its lining membrane is arranged in folds, simple douching would leave large areas of the latter untouched. The surface of this membrane is still further protected by a mucous secretion, which contains germs, harmless as long as the membrane is intact, but capable of dangerous action when once this is divided or removed. In many cases, also, purulent secretions escape from the already infected uterine canal and add to the risk. On the day before operation, therefore, if there is a possibility that the vagina may be opened, thorough disinfection must be carried out. If the uterine canal is infected, this should be dilated and curetted, painted with iodine, and a small plug of iodoform gauze introduced, the latter *after* the vagina has been dealt with. The vagina must be well opened up by a Sims' speculum, moved from side to side and from back to

front as the work proceeds. A hot douche of biniodide solution, 1 : 1000, is well scrubbed into the mucous membrane with a clean sterile tooth-brush for ten minutes, working steadily over the whole surface. This is followed by a hot creolin douche, 1 : 500, which leaves the tissues supple. A light packing of iodoform gauze is introduced, and removed at the time of operation. Some surgeons repeat the sterilisation two or three times, but, if thoroughly done, I believe once will be sufficient. The vagina is douched out again and dried with aseptic sponges on the operating table.

The Operator.—It is advisable that no one who is liable to exposure to infectious diseases, and therefore no one who attends such cases, should perform these operations. I believe that it is little short of a crime for anyone to open the abdomen for this purpose who may have been near a case of measles, scarlet fever, erysipelas, puerperal fever, influenza, or any of the numerous infectious or contagious diseases met with in general practice. The patient is absolutely ignorant of the risk thus run, a risk closely approaching a certainty ; she trusts herself, her life, and her future blindly to the good faith of the operator. Nothing can be more contemptible than for him to take advantage of her trustfulness simply for the sake of the possible fee or credit attending the work. Knowing, as all medical men do, the terrible danger attending possible infection, I conceive that it is our duty to denounce in the plainest terms any attempt to ignore or put this aside as of no importance. It is possible that in certain operative cases, such as those of strangulated hernia, it may not be possible to wait, but this is never the case in fibromyomata. All such cases can, unless culpable delay and neglect has occurred, be deferred until fitting conditions can be secured, and, amongst these, not the least is the presence of an aseptic operator. And the same remarks apply, *a fortiori*, to anyone in the position of pathologist or anatomist.

But, however free from infection, the surgeon's hands need preparation even more careful than that of the patient's skin. His hands must enter and come into contact with the peritoneum. The tips of his fingers may have to be used to peel off adhesions, and so be made to rub somewhat forcibly against raw surfaces in the

abdominal cavity. No man's hand is microscopically clean, and especially is this the case at the finger-tips. Beneath any projection of finger-nail dust, and therefore micro-organisms, are certain to be found ; and these must be most carefully asepticised.

In all cases the arms are bared as far as above the elbow. If less than this is done, the shirt-cuff will certainly drop down at the most dangerous time. The finger-nails are pared down as far as possible, so that no smallest ledge remains behind which dust can harbor. Some American and German surgeons advise the wearing of gloves, india-rubber or cotton, which are previously sterilised. It is claimed for these methods that gloves can be rendered more absolutely sterile than skin can possibly be. Cotton gloves can be boiled or steamed before use, but it seems quite as difficult to sterilise rubber gloves as it is to sterilise the skin. They certainly cannot be exposed to sufficient heat to render them germ-free. But, granting this, there is the possibility with cotton gloves of leaving behind minute particles of cotton, which will act as foreign bodies, and, above all, there is the inevitable loss of tactile sensibility, so indispensable in this work. Many of these cases are complicated with adherent pyosalpinx or ovarian abscess. These must be peeled off from the broad ligament with infinite care to avoid rupture, and much of such peeling must be done out of sight, guided by the sense of touch alone. Is it possible to imagine that this will be as safely done when the fingers of the operator are encased in gloves ? We need once more to emphasize the fact that it is impossible to obtain an absolutely aseptic operation. What we can do, and what we aim to do, is to diminish the number of germs to their lowest possible amount, trusting to the phagocytes of the body to dispose of the few which, in spite of all our efforts, will find an entrance. We are, truth to tell, in the position of the navy of Great Britain, the first line of defence. Should an invading army seek to land, the navy would destroy all it possibly could. Some small force might land. It would be immediately surrounded and destroyed by the army and volunteers. What would be thought of the admiral who refused to do his part, because, forsooth, some small vessel full of men might manage to elude his battleships and

cruisers? and withdrew his fleet, because it might not be able to annihilate all? The entire invading army landing would then probably be sufficient to overwhelm the native defenders, and carry death and destruction throughout the land. The phagocytes are the volunteers on which we depend to finish our work, but we must be careful to see that they have no more to do than they are easily able to accomplish.

Various methods of antiseptics for this purpose are described :

Wathen ¹ washes his hands with green soap and hot water, scrubbing them with sterilised brushes, and afterwards in 1 : 1000 bichloride of mercury solution.

Lockwood ² scrubs with hot water, soap, and nail brush,—the brush should be previously sterilised by steam for half an hour,—then soaks the hands for one minute in 1 : 100 rectified spirit with biniodide of mercury. Fürbringer's method is much the same.

Penrose ³ thoroughly scrubs with frequently changed hot water and soft soap and a large stiff nail brush, for five minutes at least. The hands and arms are then similarly scrubbed with alcohol, and finally with 1 : 1000 solution of bichloride of mercury. The same parts are rinsed in sterile water immediately before operation.

Schatz introduced the permanganate and oxalic acid method, which is thus carried out by Kelly ⁴ : Vigorous scrubbing for ten minutes with a brush, using ordinary soap and hot water, especially about the nails ; water to be changed four or five times. Immerse in hot saturated solution of permanganate of potash until the skin is stained a deep mahogany color. Immerse at once in saturated hot solution of oxalic acid ; this decolorises and, he says, completely sterilises them. Rinse the hands in sterilised lime water ; this precipitates the oxalate of lime. Return to wash-basins if the hands become contaminated in any way.

Gibson ⁵ advises scrubbing with green soap and water, then to

¹ Am. Journ. Obstet., 1893, Vol. 2, p. 391.

² Brit. Med. Journ., London, 1894, Vol. 1, p. 178.

³ Text-book of Dis. of Women, 1898, p. 445.

⁴ Kelly's Operative Gynæcology, Vol. 1, p. 21.

⁵ Med. Rec., N. Y., July 17, 1897, p. 82.

rub both arms and hands with a paste made by taking a teaspoonful of washing soda, a crystal of calc. chloride, and a few drops of water. He washes off this paste after three to five minutes' use.

I have personally adopted the following method: Sterilised brushes are used. The whole forearms and hands are well scrubbed for five minutes with Johnston's ethereal soap and hot water, to remove coarse dirt and to dissolve fatty materials. They are next scrubbed for three minutes with a spirituous solution of biniodide of mercury, 1 : 100. Spirit penetrates more deeply, and brings the antiseptic in contact with the skin and ducts. Biniodide is used because it does not form an albuminate, as sublimate does, and is a more effective antiseptic. (See Lockwood's paper.¹) They are now soaked in biniodide watery solution, 1 : 1000, for one minute; this washes off the spirit, and prevents the skin of the hands from becoming stiff or chapped. Lastly, they are washed in sterile water or saline solution; this prevents any antiseptic from being carried into the peritoneal cavity.

Place in Which Operation is to be Done.—This is a matter of much importance, although often treated as immaterial. In operations of this kind, however carefully prepared for, unforeseen accidents or complications are always possible, and the surgeon should have easily at hand everything he can possibly require. The room should be well lighted and warmed; there should be no draughts. There may be a bed there for the reception of the patient afterwards, but it is always better, if it can be managed, that the bed should be in another room, and on no account should the patient be allowed in the operating room whilst preparations are being made, or until the anæsthetist is ready to commence. With nervous patients anæsthesia is best commenced outside. The sanitary arrangements should be perfect.

For these and many other reasons such operations are best performed in properly arranged public or private hospitals. It is very difficult to arrange rooms in a private house so as to give the patient all the advantages she needs.

¹ Sheffield Quarterly Journ., 1896, p. 111.

Whatever room is used, it should be thoroughly prepared beforehand. If there is plenty of time, all carpets should be taken up; the floor thoroughly scrubbed with sanitas, soap, and hot water; the walls cleaned down with a large wet sponge; all unnecessary articles removed; the windows opened, and the curtains taken down. One short curtain should be fixed over the lower portion of the window. A good fire should be kept up until all is dry and the temperature of the room raised to 70° F.

If there is not time for all this, the furniture is taken out and the carpets sprinkled with water. All dust must be removed with a damp sponge from any ledges. There must be no sweeping; it only disturbs the dust and causes it to lodge in fresh places, or to form fine clouds in the atmosphere of the room which may deposit themselves in the wound.

The table is placed in front of the window, end on—the patient's head being nearest, if the Trendelenburg position is used, so that the light is thrown directly on to the abdomen, and, when that is open, into the pelvis; if the lithotomy position, as in vaginal work, the head is, of course, placed furthest from the window.

As all such operations should be done in the morning, there is no need to arrange for artificial light, but an electric head lamp is sometimes useful.

Instruments.—Amongst these, perhaps, one of them to be reckoned the most essential is a good table; and by this I mean one which can yield the Trendelenburg position. When the abdominal route is chosen, it is imperative that the pelvis should be much higher than the chest; as the bulk of the mass to be removed cannot be reduced by tapping, the opening required in the abdominal wall must be fairly large. In the dorsal position, directly the peritoneum is freely opened, unless they are restrained by extensive adhesions, the small intestines and omentum immediately tend to escape. If they are allowed to do so, they are lowered in temperature, and the surface becomes dry. The delicate endothelium of the serosa is altered in such a way that, when the abdomen is once more closed, the peritoneum will be found to have deteriorated greatly in its power of rapid absorption—that

primarily important function which stands between the patient and acute peritonitis, or septicæmia. If the intestines are replaced, this will have to be continuously done, and the persistent and repeated manipulation has an equally bad effect. Moreover, all manipulation of the small intestine greatly increases shock, another of the main dangers of abdominal surgery. If, on the other hand, the intestine be allowed to remain outside, covered by warm gauze, which is continuously kept moist and warm by repeated douching with hot saline solution, such constant douching means another assistant, whose sole duty must be to attend to this. If it is left to one who has other work to do, it will be almost certainly neglected from time to time, and the viscera will be allowed to cool below a safe temperature. Besides this, threads from the gauze, fragments of tissue, bits of adhesions, etc., will be entangled amongst or become adherent to the exposed gut, and be reduced into the cavity with it when, the operation over, this is done; and, once there, they will act as foreign bodies, nests for the development of bacteria, etc. The hot solution poured over them will, some of it, enter the cavity, and by the necessity for its removal increase the manipulation of the deep parietal peritoneum necessary in sponging out, etc. Some, probably most, will run down over the skin, and collect below and around the body of the patient. It will not remain hot, it will rapidly become cold, and so chill the skin, producing another main danger—the risk of post-operative pneumonia, pleurisy, nephritis, or any other of the many evil possibilities which surround abdominal section, and which become probabilities when the vital energies are reduced by cold.

All these risks are avoided by the Trendelenburg position, which ensures the retention of the small intestine in the normal cavity, and at its own normal temperature. In this position, if the intestines are free to move, directly air is admitted into the peritoneal cavity they fall away from the operative field into that part of the *cœlom* which is still intact. If they are not, if adhesions keep them fixed, these adhesions are themselves most easily attacked and separated. The tension upon the adhesions produced

by the action of gravity tends to widen the spaces where separation is to be done, and to render such separation safer. As each portion is loosened it sinks away, exposing the next; its own weight drags upon the parts yet unfreed, and gives the surgeon better opportunity for dealing with them. At no time are the operator's hands impeded by bulging, clinging coils of gut, as is the case in the ordinary dorsal position. In this way the operation itself is greatly shortened, and valuable time is saved. Dangers of inadvertent injury to gut from knife, scissors, or needle are now almost non-existent. The increased comfort to the surgeon is immense. This, of course, is but a very secondary consideration, but it tells also in the patient's favor, since the operation itself is certain to be more neatly and perfectly performed.

If the combined method is required, the necessity for such a table is increased, as the patient must be rapidly but evenly shifted, without jar or shock, from one position to another. Almost every continental surgeon has his own pattern. In England the one made by Down Bros., of London, has given me every satisfaction.

Sterilisation of Instruments.—All instruments should be of metal, and should be capable of being taken to pieces easily.

Cutting instruments should be absolutely clean and sharp. They may be steamed for a minute before use, and placed in sterilised saline solution.

All other instruments should be boiled for fifteen minutes before use in previously boiling water with 3j washing soda to each pint; they are then placed in sterile saline solution. They should be boiled again after operation, thoroughly cleaned, dried, and kept in a dust-free case.

Terrier¹ thinks boiling is not sufficient. He uses Poupinel's dry heat apparatus, and exposes dressings and instruments to a temperature of 150° C. for three-quarters of an hour.

Sponges.—The old marine sponge is no longer used. Its place has been taken by small masses of absorbent cotton-wool, encased

¹ Rev. de Chir., 1894, Vol. 2, p. 829.

in gauze, boiled for half an hour, and kept in biniodide solution, 1:3000, or sterile salt solution. Larger flat sponges are made, sterilised and preserved in the same way. Before use, they are wrung out of hot sterilised saline solution. They may also be sterilised in a Vaillard or Schimmelbusch steriliser.

Sutures and Ligatures.—These are of horsehair, silkworm-gut, catgut, and silk. Kangaroo tendon is preferred by some, as by Jacobs, of Brussels, to catgut.

Methods of Asepticising Catgut or Kangaroo Tendon.—Pozzi's ¹ juniper process: Remove oil with æther; place gut for four hours in sterilising oven at 284°; place for one hour in aqueous solution of hyd. bichlor. 1:1000; place for eight days in ol. juniper. ligni; preserve in sp. vin. rect. with one-tenth part oil of juniper. Before using, put into aqueous sublimate solution.

Frederick's ² formalin process: Wind catgut on glass spool tightly, fixing both ends; place spools in aqueous solution of formalin, 1 part in 14. No. 0 gut is immersed for one hour; No. 1, three hours; No. 2, five hours; No. 3, seven hours. Wash gut for as many hours as it has been immersed in the formalin solution. Boil both gut and receptacle in which it is to be kept for fifteen minutes. With sterile forceps place the spools, each size by itself, in wide-mouthed glass-stoppered bottles. Keep in 95 per cent. alcohol with 8 to 10 per cent. of sterile glycerine. Such catgut will last in the tissues seven to ten days. Senn adds to preservative liquid, iodoform 1 part in 10.

To chromicize: Place spools first in potass. bichrom., grs. xxij; glycerine, aq. carbol., āā 3 iiss; aq., Oij; and leave for twenty-four hours. Drain and dry for a few hours; then place in formalin solution, and proceed as above. Gut so prepared will last in the tissues six weeks.

Cumol method (Krönig): Gut must first be thoroughly dried by dry heat at 70° C. for two hours, the temperature being *slowly* raised, or else the gut will be rendered brittle; the temperature must not exceed 100° C. When dry, transfer to glass jar filled

¹ Pozzi, *Gynæcology*.

² Amer. Journ. Obstet., 1899, Vol. 1, p. 338.

with cumol and place in a sand-bath. Sand must surround the jar to two-thirds of the height of the cumol, so that the latter may be heated as evenly and rapidly as possible. Cover jar with a piece of glass. Place two Bunsen burners beneath the bath. When the boiling-point of cumol is approached, remove one burner. Keep at or near this point ; no need to actually boil, as this wastes the cumol. At the end of one hour, remove burner. When the cumol has cooled, the catgut is removed by sterile forceps and placed in a sterile jar filled with petroleum benzine for three or four hours, which removes the cumol. Preserve in absolute alcohol. Such catgut is absorbed in seven to fourteen days, according to size.

Donald soaks catgut in æther for twenty-four hours, and then preserves in Bergmann's solution.

Any of these methods are reliable, but gut prepared according to the formalin method is very apt to become brittle. Of the three, the juniper method has given me the best results.

Mirovini³ says that water impairs the strength of catgut. Formalinisation and chromicisation increase its resistance against water. Catgut may be indefinitely preserved in any fluid with a boiling point below 100°, as alcohol, æther, chloroform, if absolutely free from water. Exposure of catgut to a temperature, moist or dry, of 150° for two hours, will destroy all germs. Preservation in hydrarg. bichlor., formalin, chromic acid, or oil of juniper has a similar effect. Such preservation increases the rapidity of its absorption, which, however, is not as rapid as is supposed. He was able to demonstrate the presence of catgut in the tissues of a dog one hundred and twenty-five days after use.

Silk, horsehair, and silkworm-gut must be wound on spools or stretched on frames, well shaken in æther to remove wax or grease, then boiled for thirty minutes in soda solution 1 per cent., then for fifteen minutes in 5 per cent. carbolic solution or sterilised in Vaillard's steam steriliser for ten minutes at a pressure of

³ Deutsch. Zeit. f. Chir., Bd. 53, Hft. 142.

2 kilos, and preserved in Bergmann's solution, the formula for which is :

Æthylic alcohol,	800 parts
Sol. hyd. biniod., 1:10,	10 parts
Aq. steril.,	to 1000 parts.

Plaited silk is more convenient to handle in the finer sizes. The thicker strands should be twisted; thick plaited silk cannot be safely asepticised.

Dressings.—These, as well as the towels required to surround the operative area, are best steamed under pressure in Vaillard's steriliser, which permits of the escape of the steam after it has thoroughly permeated them. The materials, when taken out, are then quite dry. For some time now, however, I have almost ceased to use dressings of any kind, preferring to seal the wound with celloidin, which forms an air-tight and impermeable covering. In vaginal operations I use iodoform gauze, preserved in air-tight wide-mouthed bottles, as a drain for the first few days. A pad of absorbent wool is kept in place over the vulva by a T-bandage.

¹ Amer. Journ. Obstet., 1895, Vol. 1, p. 509.

CHAPTER X.

THE TECHNIQUE OF OPERATIVE METHODS.

The various methods in which surgical treatment may be applied are now to be detailed.

These may be divided into three main classes :

A. Methods which decrease the nutrition of the tumor.

B. Methods which remove the tumor alone.

C. Methods which remove the uterus and tumor.

Before considering these various operations, certain points require, I conceive, to be emphasized, as influencing our choice of one or other of them in any given case :

1. All these tumors, but especially those of the hard, multinodular variety, have but a feeble internal circulation. Even in the angiectatic varieties the arterial supply is comparatively small, the great bulk of the tumor being composed of dilated veins or lymphatics. If the interference with this is great, whilst the tumor remains, necrobiosis is very easily induced. If, by any route, micro-organisms obtain admission whilst this is in progress, sloughing, with all its attendant risks of septicæmia and pyæmia, is certain, and the risks to the patient are greatly increased.

2. A slight decrease in the supply will check the growth of these tumors, and ensure their regression ; hence the success in so many instances of Tait's operation. The amount required to do this must vary in almost every case, within a certain range, which it is almost impossible to define. Too little will have no effect ; too much may cause local necrosis. Either result would be unsatisfactory.

3. The main dangers of all these tumors originally crystallize around two things—hæmorrhage and pressure effects. Any method which does not, in any given case, put a stop to the particular danger existing in that case is useless for it.

4. Experience has shown that certain operations have no effect in certain cases ; thus, the operations in Class A have no effect upon an œdematous or fibrocystic tumor.

5. In total hysterectomy *per vaginam* the bulk of the tumor should not be greater than about that of a four months' pregnancy. Personal skill will, of course, prevent this from becoming an absolute rule.

6. Tumors invading the broad ligament, or tumors having many abdominal attachments, especially to intestine, are best attacked from the abdominal side, or by the combined methods.

7. All tumors in which malignant pathological processes are suspected or proved to exist require entire ablation, not only of themselves, but of the organ in which they have developed.

The first class is rarely completely successful ; like all half-hearted attempts to deal with fibroids, it is far more risky than more radical measures. It is, moreover, often far more difficult to carry out. Even in cases of apparent immediate success there is no certainty against a recrudescence of the growth. It is more *risky* because, in the case of large tumors, if too much of their nutrition is suddenly cut off, sphacelation of the tumor is easily produced ; and especially is this the case if the uterine arteries are ligatured. It is more *difficult* in cases of large tumors, supposing the ovarian arteries to be in question, because, while one artery may usually easily be secured, the other may be inaccessible ; if the uterine arteries, they may both be impossible to reach,—from the vagina because the uterus is carried so high up, from the abdomen because they are buried beneath the growth, and are inaccessible until the tumor itself is removed. The methods, therefore, included in this class are not recommended, but are described for the sake of completeness alone.

CLASS A.

This class includes four operations :

1. Hegar and Tait's operation, or ligature of the ovarian arteries from above with removal of appendages.

2. **Gottschalk's operation**, or ligature of the uterine arteries *per vaginam*.

3. **Altuchneff's or Hartmann and Fredet's operation**, or ligature of the uterine arteries from above after abdominal section.

4. **Franklin H. Martin's (Chicago) operation**, or vaginal ligature of the entire broad ligament.

1. **Tait's or Hegar's Method.**—

Technique.—Dorsal position. Median abdominal section 2–3 inches. Two fingers are introduced, and find appendages on one side; these are drawn into the wound; a needle carrying a double thread is passed through the meso-salpinx, at a point midway between the two ends of the tube, and free from blood-vessels; one thread is brought outwards, so as to include the vessels passing into the distal extremity, and tied (Fig. 23). All the parts included are divided above the knot, which should be tightened up during the division. The second thread is then drawn towards the uterus, and made to include the ovary, and all the tube up to the uterine cornu, which is divided whilst the thread is drawn tight and knotted; sufficient of its peritoneal coat is left to permit of this being tied over the cut extremity of the tube, so as to shut off its lumen completely from the *coelum*. The first appendage being thus dealt with, the uterus is drawn over to this side or rotated by the fingers until the opposite appendage is found, drawn into the wound, and dealt with in a similar manner. The abdomen is then closed.

It will be evident that with small tumors, or in cases where no adhesions exist, this procedure is simple and easily carried out. Difficulties arise and increase in proportion to the presence of such adhesions and the increasing bulk of the tumors.

The appendages may be absolutely buried in adhesions. These may involve the omentum, which is usually easily tied off, or small intestine and bladder, the sigmoid flexure, or the rectum. The latter category require great care in separation, and, even when peeled off, the raw surfaces left may be very extensive, and may bleed in a very persistent fashion. The blood does not often come

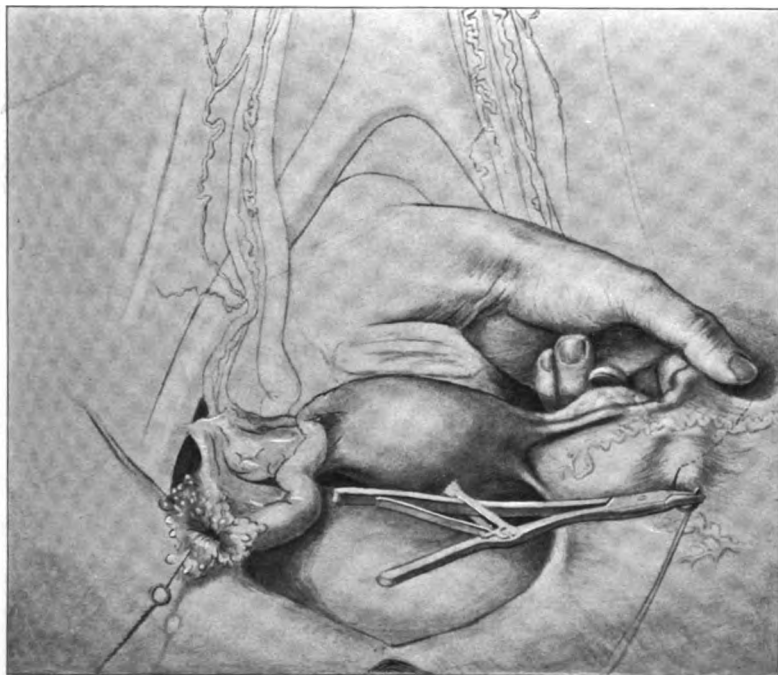


FIG. 23.—REMOVAL OF APPENDAGES.

The forefinger of the left hand demonstrates the space clear from vessels through which the needle is passed. (Modified, by permission, from Kelly's *Operative Gynæcology*.)

from any definitely spouting vessels, which might be tied, so much as from a general oozing over the whole surface. The peritoneum also, when divided in this way, opens out, so that what appeared as a small area before division becomes a much larger one afterwards. Such raw surfaces, if the peritoneum cannot once more be made to cover them, will infallibly produce fresh adhesions during the next few months, with a return of all the unpleasant sensations and impediments to easy intestinal action which they entail.

Should the tumors be large and multiple, the appendages may be buried between any two of them ; but even if this does not occur, a single tumor, developing towards the broad ligament, may separate the two layers of peritoneum which form the meso-salpinx, until the tube and ovary lie spread out over its surface, all free pedicle having disappeared. The vessels, and especially the veins, are enlarged and are very easily wounded. If a ligature is safely passed, and an attempt made to dissect off the tube and ovary, their connections, being in a state of tension, retract as soon as freed, and slip out of the ligature, if this is not tightened beforehand. If it is so tightened, it becomes loose as soon as the parts are divided, and, once slipping commences, it is very difficult to stop. If the vessels retract, the bulk of the tumor will prevent their being readily secured, and as they immediately begin to bleed into the subperitoneal tissue, a large hæmatoma is quickly formed, in the midst of which the vessel is lost, and defies all search. It will be evident that this method has its limitations.

Tait¹ reports 262 cases with 4 deaths, a mortality of 1.5 per cent. ; Christopher Martin,² 29 cases with 3 deaths, a mortality of just over 10 per cent.

Dr. C. J. Cullingworth² sends a list of 5 cases, making, with those already published by him, a total of 25. His last case is dated March, 1897. All made immediate recoveries. One could not be traced ; of the other four, the mass appears to have diminished markedly in all. Two gave apparently perfect results : in one, the menstruation was irregular for two or three months, with

¹ Abdominal Surgery, Vol. 1, p. 210.

² Private letter.

scarcely a stain, but this was followed by a series of profuse and prolonged periods, the discharge being very dark ; in another, after the operation the health was variable, fairly well for some weeks, then troublesome vaso-motor phenomena appeared. In three other and incomplete operations one or both of the appendages could not be recognised.

2. Gottschalk's Method.¹

This method is by the author expressly reserved for intraparietal tumors which are exclusively nourished by the uterine arteries, and are not too voluminous, up to the size of an orange ; for those also which have no secondary adhesions to surrounding viscera. Intraligamentary fibroids and those springing from the fundus are excluded. (See chapter on Anatomy, p. 56.) In seven years he only found 20 cases in which it appeared wise to operate in this way. Of these cases, 16 are reported in full, the rest having been operated upon too recently for any conclusion to be drawn from them, or having disappeared. Of these 16, the majority showed a disappearance of hæmorrhage and pain, the menses became normal, but in certain cases the good result was considerably delayed—*e. g.*, in case 7, two years after there was a return of hæmorrhage which lasted ten days ; in one, case 10, fifteen days after, a necrosed, fetid, thick membrane was expelled from the uterus ; in another a similar membrane was expelled ten days after, in both cases with violent pains.

Technique.—Lithotomy position. In all cases where a submucous myoma is suspected the uterus is dilated and explored, since all myomata seated actually in the uterine cavity are to be radically extirpated. Curettage is done in all the cases. A circular incision is then made in front of the cervix, being prolonged upon the sides as far as the posterior surface ; the bladder is then bluntly dissected from the surface and broad ligaments on either side ; the posterior vaginal mucosa is also detached on either side of the cervix, on each side the vascular uterine pedicle being isolated by the finger.

¹ Ann. de Gynéc., Paris, 1898, Vol. 49, p. 355.

In this is felt the pulsations of the principal branches of the uterine artery—generally two; it may be, three. For the sake of security Gottschalk always applies three ligatures, using strong silk and a Deschamp's needle. If too fine silk is used, there is a risk, with atheromatous arteries, that they may be cut through. He has twice met with this accident. The knots are cut short and buried by a vaginal suture of the mucosa. A pad of iodoform gauze is placed in the anterior vaginal cul de sac. The vaginal cervix becomes livid; other operators say it becomes white. The patient is kept in bed eight days. He gives hot douches for a long time afterwards, and makes his patients take ergotine pills. As an immediate result of the operation, severe pains appear habitually, which patients compare to the pains of labor. They persist for about six days with a certain number of patients, gradually diminishing in intensity, and are usually followed by the discharge of a cast of the uterus, which must include the inner muscular layer, since the endometrium has been previously removed by the curette. In only three cases did the first menstruation appear at the normal period; in all the rest amenorrhœa occurred, and remained for various periods—five weeks up to five months. In two menstruation was suppressed permanently. Delagenière considers this method worthy of very serious consideration in cases of small interstitial fibroids, when the dominant symptom is hæmorrhage.

3. Hartmann and Fredet's Method¹ (Ligature of Uterine Artery from Above).—

Technique.—Trendelenburg position. Median incision commencing $1\frac{1}{2}$ cm. above the pubes and terminating 1 cm. below the umbilicus. The intestine is kept out of the way by sterilised compresses and the borders of the wound are held apart by retractors. The ovary is found and lifted up. Beneath it is the ovarian fossa. The ureter can be seen at this level, lying upon the psoas. Parallel with this, and a little in front, a peritoneal incision is made of some centimetres in length. The peritoneum

¹ Ann. de Gynéc., Paris, 1898, Vol. 49, p. 110.

being raised, about 3 cm. below, the uterine and hypogastric arteries are found at the point where these vessels pass in front of the ureter (Fig. 24). A ligature is passed around one or both with an aneurism needle, and they are tied. The peritoneum is united over the buried ligature and the abdomen closed. It is immaterial whether the uterine artery or the utero-hypogastric trunk is tied. The authors only perform this operation if the uterine arteries are not accessible from the vagina; and, therefore, it finds its most usual employment in cases of carcinoma uteri. Altucheff¹ proceeds in a similar way. His incision, however, passes through the anterior leaflet of the meso-salpinx, immediately behind and parallel with the round ligament (Fig. 25). He takes advantage of the fact that traction forwards and upwards of the round ligament at this point draws upwards the uterine artery, thus rendering it more accessible. His diagram is intended to show this point, as well as the direction of the incision required to reach the artery.

4. Franklin H. Martin's (Chicago) Method.²

Principles of His Operation.—1. To close not only the principal trunk of the uterine artery, but all its collateral branches.

2. To suppress the function of the nerves.

3. To diminish nerve reflexes.

4. In severe cases to tie also the utero-ovarian artery.

5. Whilst attempting to avoid the opening of the peritoneum, there is no hesitation in doing this if necessary.

Technique.—Lithotomy position. The cervix is dilated, curetted, washed out with bichloride solution 1 : 1000, and loosely packed with gauze. The cervix is caught with forceps and pulled down to one side, so as to expose the opposite cul de sac. The vaginal mucosa is seized with a tenaculum and incised with scissors. One of the blades is passed into the wound above the mucous membrane, and a curvilinear incision is made, $1\frac{1}{2}$ to 2 cm., by the side of the cervix. The two forefingers are used to separate the bladder in front and at the sides for a distance of about 2 inches. The broad ligament is also isolated behind for a similar

¹ Monatschr. f. Geburtsh. u. Gyn., 1896, I, 111, p. 453.

² Ann. de Gynéc., Paris, 1898, Vol. 49, p. 290.

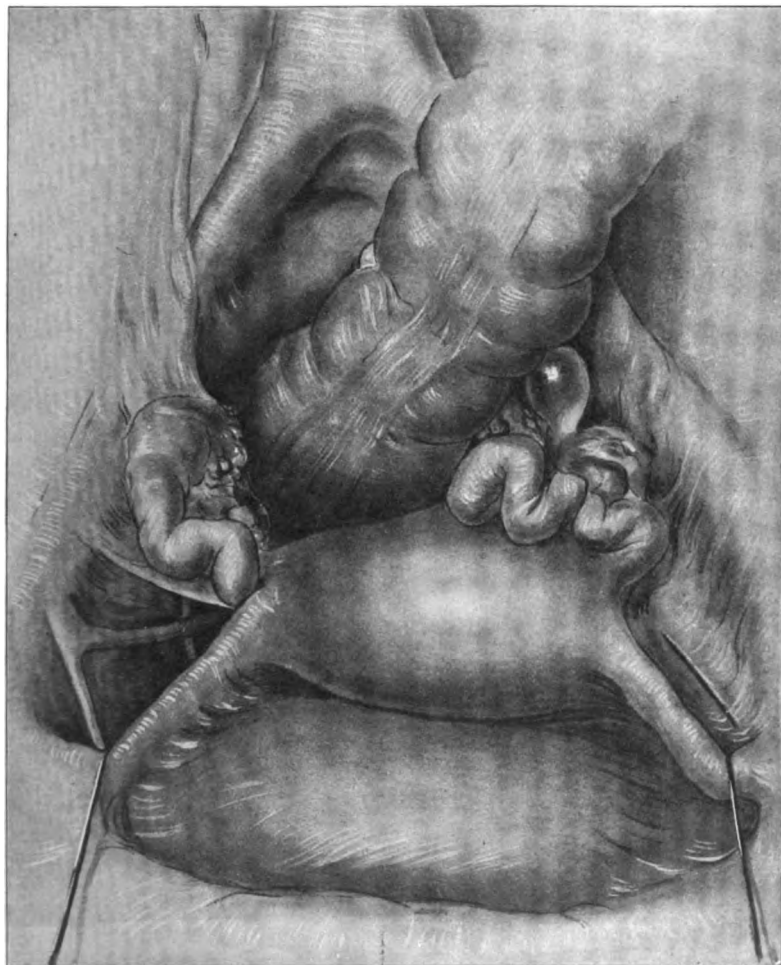


FIG. 24.—HARTMANN AND FREDET'S METHOD. LIGATURE OF UTERINE ARTERIES FROM ABOVE.

On the left side is seen the position of the ureter, and of the uterine artery. On the right is shown Altucheff's incision of the ovarian fossa. (Modified, by permission, from Kelly's *Operative Gynæcology*.)

height, avoiding, if possible, the peritoneum. One finger behind, and one in front, will then feel between them the pulsations of the uterine artery and its collateral branches. A curved needle is then passed above this, and a silk, kangaroo-tendon, or catgut ligature is carried by it around the whole base of the broad ligament. This is tied, cut short, and buried. The mucous membrane is united over it by points of catgut. The same procedure is carried out on the opposite side. A light gauze vaginal tampon is placed for drainage. On the second or third day the vaginal and uterine gauze is removed, and this is followed

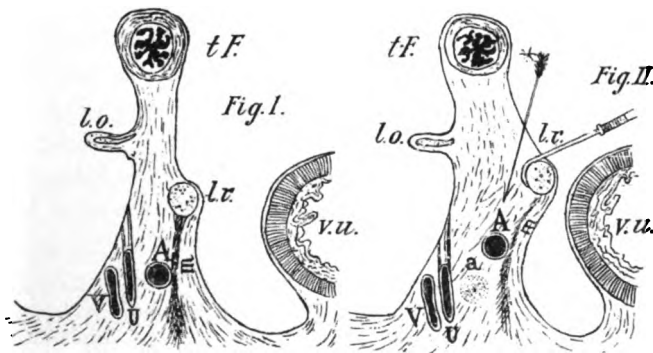


FIG. 25.—LIGATURE OF UTERINE ARTERY FROM ABOVE.

Schema showing relation of the uterine artery to other structures. Vertical antero-posterior section passing through the centre of the Fallopian tube. Fig. 1 shows the normal position; Fig. 2, the position as altered by traction upon the round ligament. *t.F.*, Fallopian tube; *l.o.*, ovarian ligament; *l.r.*, round ligament; *m*, mesentery of round ligament; *A*, uterine artery; *U*, ureter; *V*, uterine vein; *v.u.*, bladder. (*Ann. de Gyn.*, 1898, Vol. 48, page 122.)

by vaginal injections twice daily of bichloride solution. Martin advises this operation in interstitial tumors alone. The cases most fit for this proceeding are small ones in the later periods of menstrual life, in which hæmorrhage is severe. Also in cases of great weakness, where a severer operation might not be well borne. In one case three years have elapsed since the operation. At the time of intervention the patient had been bleeding almost continuously for several months. She was forty years old. The cervix was large, bluish, and very vascular. After ligature this became almost as white as cartilage. The uterus was the size

of a three months' pregnancy. Three years after the uterus was normal in size, the hæmorrhage having completely ceased. All pain had gone. Menstruation was and had been since normal. The general health was completely re-established. Improvement commenced immediately after the operation. Martin gives 13 cases, one failure, no deaths. In some, the pain and loss of blood continue for some time after the operation, and he notes that the results improve as time elapses after operation.

CLASS B. METHODS WHICH REMOVE THE TUMOR ALONE.

SUB-CLASS A.—VAGINAL

Section 1.—*If pediculate.*

Section 2.—*If submucous and sessile.*

Section 3.—*If interstitial.*

SUB-CLASS B.—ABDOMINAL

Section 1.—*If pediculate.*

Section 2.—*If subperitoneal and sessile, or interstitial.*

SUB-CLASS A.

Section 1.—Tumors which were intra-uterine and polypoid had been removed long before the present custom of naming operations after their first performer came into fashion, and their removal is described in all works on diseases of women.

Technique.—Present method: Patient in lithotomy position. Auvard speculum. Uterine canal fully dilated. It is preferable to dilate with some quickly acting instrument. Goodell's dilator is, I believe, the best; Tait's dilator perhaps the worst. Some surgeons prefer Hegar's dilators, but they have the same drawback as those of Tait—namely, that to introduce them it is necessary to combine a pulling and a thrusting movement. In the use of the smaller sizes it is very possible to give a slightly wrong direction to the instrument, and to thrust it through the uterine wall, particularly as in these cases the uterine canal is often no longer

straight ; this is especially the case in the next class of operations. This risk is repeated with each stem until the larger sizes are reached. With a dilator of the type of Goodell's this risk only occurs once, and even then is not so great. The thrust also is given against a counter-fixation by a pair of Museaux forceps attached to the os. If there is any difficulty in getting any given size to pass, these forceps are very apt to tear out, leaving a ragged wound. This wound, bathed in the secretions of the part, with any discharges from the uterine canal, may easily become the starting-point of septic processes—the very thing of all others we wish to avoid. The previous use of laminaria or tupelo tents is not often necessary, as the canal is usually somewhat dilated and softened already by the presence of the tumor. Sponge tents are, I believe, never used now. It was impossible to properly sterilise them. Of course, if the tumor presents in the vagina, dilatation is not necessary ; it has already been performed by the growth. The polypoid mass, being seized by a long narrow forceps, is either twisted slowly off from its base, or, if that is not possible, the loop of a wire *écraseur* is slipped over it, guided up to its base, and tightened gradually up. This loop is either screwed up until it slowly cuts through the pedicle, or, as I prefer, is heated, by an electric current sent through it, to a dull red, and allowed slowly to burn through. The heat affects the base, and, I believe, has a good effect on the hyperplastic endometritis which accompanies these growths. Certainly, it seals and renders absolutely aseptic the raw surface otherwise left.

Section 2. Enucleation per Vaginam.—In 1879 Goodell¹ wrote that “the simplest and safest method was to dilate the os after several incisions, and to keep up a persistent contraction of the uterine fibres by the continuous use of ergot. If, however, there should be no disposition on the part of the fibroid to become polypoid, the process must be aided by incising the capsule. This may be done, as Atlee recommended, with the curved and probe-pointed bistoury, wrapped in lint to within half an inch of its

¹ *Lessons in Gynæcology*, Goodell, 1897, p. 304.

point." Goodell preferred Adams' subcutaneous saw. "The finger should at once be passed into the incision, in order to separate the lips of the capsule, and break up its attachments to the tumor. The patient is now put on the steady use of ergot, and the extrusion of the tumor is left to the expulsive powers of the womb. The process of gradual enucleation may last for weeks. . . . Peritonitis may carry the patient off, or, what is more common, blood poisoning through the absorption of putrilage during the breaking-down of the growth. . . . The operation is a warrantable one in certain cases." Duncan made an incision of 1 inch in length. Greenhalgh¹ burnt merely a hole through the capsule with the actual cautery.

Later developments of this operation :

Technique.—Pean's method: Lithotomy position. Auvarde speculum. Lateral retractors. The os is seized by vulsellum forceps and drawn down as far as practicable; the uterine canal is dilated, so that a good view is obtained of the presenting mass. The mucous membrane over this is incised vertically, as completely as possible. If the greater part of the circumference of the capsule can be divided, so much the better, but this is rarely the case without going further than the eye can follow. The capsule once opened, the milky white substance of the tumor becomes visible; this is seized by strong vulsellum forceps (Doyen's are the best), a portion is drawn downwards, and, a bite with a second forceps being taken above, the first portion gripped is cut away and a fresh grip obtained; this process is repeated until all the white fibrous mass is removed. From first to last it is kept on the stretch, for two reasons: first, to stimulate the muscular fibres outside it; and, secondly, to avoid sudden retraction of a fragment, which would be difficult to find again, and, if lost, would keep up persistent hæmorrhage from the cavity, the proper contraction of which it would prevent. Often the last portion of the mass is shot out of the cavity it previously filled by the spasmodic contraction of the muscular fibres around, which have been pre-

¹ Med.-Chir. Trans., London, 1876.

viously kept on the stretch by the steady enlargement of the mass. Note the manner in which the muscular fibres of the uterine wall retract after division in figure 8, as indicating the tension to which they have been subjected, since the division was made after entire removal of the uterus, and, in figure 1, the projection of each of the multiple masses from what is the normal plane of the incision. When all is expelled, this contraction prevents consecutive hæmorrhage, and obliterates the cavity previously existing. The following case illustrates the method and its results :

M. F., æt. 30, weaver. Admitted into Ancoats Hospital, Manchester, February 21, 1896. Married 8 years. Widow 6 years. No children. No miscarriages. Commenced menstruation at 13 years. Periods easy until 15 years, when leucorrhœa began, followed by pain before each period, which at first lasted an hour, latterly has lasted a day, gradually disappearing as flow became established. Period lasts a week, 5 napkins per day. Dysuria began two years ago, and has gradually increased. Stream is sometimes good, sometimes dribbling, never involuntary. Urine 1012. Normal.

P. V.—Fibroid uterus, size of child's head, with small irregular boss on left at upper part. Cervix drawn up, passes uninterruptedly into the tumor. This is hard, situated in anterior wall. Uterus moveable. Nipples pink. No areola. Breasts small.

March 3d.—No hæmorrhage since admission.

March 13th.—Hæmorrhage from 6th to 10th free. Mass rather smaller.

March 19th.—Tent introduced with difficulty owing to narrowness of vagina and rather conical cervix.

March 20th.—Tent has dilated cervix slightly and rendered it softer. Under chloroform this is further dilated by Duke's dilator, and then by Allingham's rectal dilator. In using latter, cervix somewhat split on right side. Finger introduced into uterine cavity feels soft firm mass in anterior wall, filling it and bulging the mucous lining into canal. A sound passed into the bladder shows mass between it and examining finger to be size of large fist. Anterior wall was divided from within, exposing a pinkish-white mass. This was separated to some extent from the uterine tissue by finger, seized by vulsellum forceps, and dragged downwards. It was split by scissors and removed piecemeal. The last and largest piece was squeezed out rather suddenly by the contraction of the uterine muscular fibres. Operation lasted 1½ hours and was very tedious and difficult. Gauze tampon left in uterine canal and vagina, there being practically no cavity left in anterior wall, owing to muscular contraction.

March 21st.—Vomiting at intervals for 2½ hours, none afterwards. Uterine tampon removed. Vaginal ditto replaced. T. four hours after operation 98.2°; rose to 103° by 6 A. M. to-day; fell to 100° by 2 P. M. R. at 6 A. M., 26. P. 140.

Bowel moved on 22d. Irrigation from 22d, when vaginal tampon removed.

March 26th.—T. was 101.6° last night. P. 106. T. is 100° this morning. P. 108. R. 20. Bowels moved twice. Irrigation has been kept up thrice daily since 22d. Some thin pus without odor issuing from os. Posterior wall of vagina near os is slightly excoriated. Patient pale but cheerful. Nutrient enemata have been given every four hours up to 4 P. M. on 22d; then every six hours until 6 P. M. on 23d. Food by mouth commenced on 22d. Is now taking low diet well.

Catheter was required until 10 A. M. on 23d. Urine first passed naturally on that day. Amount of urine: 7 oz. on 20th, 17 oz. on 21st, 16 oz. on 22d, 22 oz. on 23d.

April 12th.—No pain anywhere. Sound passes normal distance. T. has been normal with slight variations since March 31st.

April 26th.—Uterus normal. Moveable. No pain or discomfort. Very slight puriform discharge from os. Has been up and about ward since 22d.

May 4th.—Discharged. Perfectly well. Reported herself again on 18th in perfectly good health.

Schauta¹ would limit this operation to cases in which part of the tumor is born. He lays stress, as all modern operators do, upon the necessity of finishing the operation in one séance on account of the danger arising from possible sepsis or gangrene—the main causes of the high mortality of Duncan and Greenhalgh's cases.

Section 3. Interstitial Vaginal Enucleation after Colpotomy, with Subsequent Uterine Suture.—In the previous operation the tumor is removed from within the uterus; but it may also be removed from without; also through the vagina. It is presumed that the tumor is in the anterior wall. If it were in the posterior, the steps are still the same, except that Douglas' pouch is opened instead of the anterior cul de sac. The steps of this operation are:

Technique.—Lithotomy position.

1. Auvard's speculum.

2. The os is seized by strong vulsellum forceps and drawn downwards and backwards.

3. A semicircular incision is made in the anterior cul de sac, through the vaginal mucosa.

¹ Med. Press and Circ., London, August 30, 1899, p. 207.

4. The bladder and ureters are freed by blunt dissection from the anterior uterine wall and the peritoneum opened or not as may be required.

5. A long broad retractor is passed into the space so formed and the bladder is lifted up, the uterus being drawn backwards.

6. A vertical incision is made into the wall of the uterus and the capsule of the tumor, and the latter is shelled out.

7. The cavity left is united by buried sutures.

8. The uterus being restored to its normal position, the vaginal wound is closed by interrupted catgut sutures.

SUB-CLASS B.—ABDOMINAL.

Section 1. Subserous Pedunculate.—*Abdominal myomec-tomy*: This operation varies simply according to the size and length of the pedicle. In long narrow pedicles all that is necessary, after opening the abdomen and disengaging the tumor from its attachments, if any, is to bring it outside, and, whilst it is held in this position, a circular incision is made around the pedicle through the peritoneal covering. This is turned down in the form of a cuff, towards the uterus; a strong silk or chromic gut ligature is passed around the core so exposed, close to the uterus, and tied tightly. The tumor is cut away, the peritoneal cuff turned back again, and united by fine catgut over the raw surface, so burying the ligature. This is a very simple and easy procedure. It is otherwise when the pedunculated fibroids are many and their pedicles short and broad. Multiple pedunculated fibroids are usually associated with others which are still interstitial; which, in their turn, may become pedunculated, and require a second and similar operation for their removal. When this is done, there is no security against a third repetition. Such operations cannot be indefinitely repeated, and it becomes a question whether it is not wiser, and really more conservative, so far as the patient's health is concerned, to remove totally the affected uterus at first by one of the methods presently to be described. Should it, however, be thought advisable to proceed, the following is the technique. This operation is Schroeder's, and is equally suited to sessile

growths (**Sub-class B, Section 2**), which are, indeed, practically identical, except in degree.

Section 2. Subperitoneal and Sessile or Interstitial.—

Schroeder advises temporary constriction of the cervix by rubber ligature after double ligature and division of infundibular pelvic ligament with the spermatic vessels, and of round ligament on both sides; enucleation of tumor; sometimes tumor is enucleated before application of the rubber ligature, up to its attachment to the uterus; division of this and suture in tiers; suture of peritoneum. Reports, in 1883, 66 cases; death, 30 per cent. Of last 40 cases, 22.5 per cent.

When tumors are developed at the lower part of the uterus, extending into the cellular tissue of the pelvis:

Technique.—1. Abdominal section, median line.

2. Doubly ligature appendages and round ligaments on each side, and divide between.

3. Split capsule and enucleate tumor out of the pelvic cellular tissue.

4. Apply rubber ligature around cervix. Schroeder has found this often unnecessary.

5. Enucleate from uterus.

6. Unite wall of uterus by deep sutures passing just outside mucosa, and cover it with sutures in layers, finally suturing peritoneum.

7. If necessary, drain gap in broad ligament into the vagina.

Hegar¹ uses a stretched elastic cord taken two or three times round the part to be constricted, the ends crossed and held by forceps. Pozzi has a special instrument for fixing these ends temporarily; as also has Segond. Billroth clamped the pedicle of pedunculated fibroids, placing his sutures in the furrow which it produced.

Pozzi's description of abdominal enucleation of interstitial or subserous sessile tumors follows closely that of Schroeder's given above, except that he advocates that great care should be taken not

¹ Berl. klin. Wochenschr., März, 1876.

to open the uterine cavity. He closes the wound by sutures which take in the entire wall down to the mucosa. A. Martin is said to have opened the uterine cavity ten times out of sixteen, in which case he closed the mucous layer with a continuous catgut suture. Of these 16, there were 3 deaths—18.7 per cent.—and there was one return. Pozzi says that this possibility of return is the weak point in this method, and that, therefore, abdominal enucleation should always be combined with castration. If that is so, it seems to me to do away with the whole and sole *raison d'être* of the operation; since it is understood that the idea of enucleation at all, and by any method, is to save the uterus, so that it may again fulfil its proper function—that of child-bearing.

Kelly's¹ operation :

Technique.—Trendelenburg position.

1. Free abdominal incision with elevated pelvis.
3. Isolation of the tumor with gauze.
3. Incision around the pedicle or through the capsule, exposing the tumor.
4. Temporary control of hæmorrhage by clamps, or ligature around the cervical portion of the uterus.
5. Enucleation of tumor.
6. Permanent control of hæmorrhage by ligatures and buried sutures, sometimes by ligature of the uterine arteries.
7. Closure of the uterine incisions, giving careful attention to the angles, and seeing that no hæmorrhage continues between the sutures.

Before satisfying oneself as to this, the table should be dropped to the level.

8. Closure of the abdominal wound without drainage.

A. Martin,² of Berlin, uses this method also in order to remove submucous myoma which for any reason cannot easily be attacked *per vaginam*. It is necessary that the vagina and uterine cavity shall be capable of thorough previous disinfection.

¹ Operat. Gynæcol., Vol. 2, p. 357.

² Centralbl. f. Gynäk., Leipzig, July 31, 1886.

This operation is therefore contraindicated if there is a foul discharge.

His *technique* is as follows :

1. Abdominal section.
2. Delivery of uterus through the wound and isolation by gauze.
3. Temporary hæmostasis by rubber ligature around cervix.
4. Section of uterus, which opens its cavity.
5. Shelling out of tumor.
6. Closure of the uterus by catgut and sutures 1 cm. from margin of incision, passing down to, but not through, the mucosa, passing across to opposite side, and emerging $\frac{1}{2}$ cm. from opposite edge.
7. Half deep sutures between these, or at any point of imperfect approximation.
8. Removal of gauze and temporary ligature, and closure of abdomen.

Schauta restricts this method to isolated tumors not larger than a man's fist. He performed enucleation twenty-five times with five deaths, of which three were from embolism and pneumonia.

Cullingworth¹ sends a list of six cases of myomectomy, of which five recovered. The sixth, which died on the fifth day, was a large, inflamed, adherent cystic subperitoneal fibroid, nearly twelve pounds in weight, and containing over four pints of dark fluid blood ; the liver was large and fatty ; the left pleural cavity obliterated by adhesions ; the heart fatty, the left ventricle being hypertrophied. All the tumors were pedunculated subserous fibromyomata. He writes : "I am not enamoured of myomectomy as a substitute for hysterectomy in interstitial or multiple fibroids."

Zweifel had 5 deaths in 186 myomectomies. Total mortality, 2.7 per cent.

The latest method included under this heading is that proposed by Alexander, of Liverpool.² Its object is to remove multi-

¹ Private letter.

² Brit. Gynæc. Journ., London, May, 1898, p. 47.

ple fibroids—interstitial, submucous, or subperitoneal—through one uterine incision, performed after abdominal section. His method is as follows:

Technique.—1. Abdominal section in median line.

2. Delivery of uterus through abdominal wound.

3. Packing around with sponges.

4. Vertical incision in uterus over first tumor until white surface is seen.

5. Enucleation of tumor by blunt dissection.

6. Compression of any bleeding points.

7. Incision of base of cavity towards second tumor.

8. Repetition of last three steps as often as necessary until all tumors have been removed through the original opening in the uterus.

9. A sponge is stuffed into the cavity left.

10. Removal of sponge and packing with gauze, one end of the single strip emerging from the lower end of the uterine wound.

11. Closure of the rest of the uterine wound by deep and superficial sutures.

12. A single silkworm-gut suture is passed through the uterus at the upper end of its incision, and each end is passed through the whole thickness of the abdominal wall at the upper end of the laparotomy wound, being tied externally so as to fix the fundus uteri temporarily to the abdominal wall. Before tying this, all sponges are removed.

13. Closure of abdominal wound, except at the lower end, where the uterine gauze strip emerges.

14. Removal in forty-eight hours, and day by day afterwards, of a portion of the uterine gauze. The fixing ligature is removed on the fourteenth day.

15. If the uterine cavity is opened, a drainage-tube, in addition to the gauze, is passed right through, emerging below into the vagina, above in the abdominal wound.

He brought forward eleven cases, with three deaths.

In the opinion of the present writer this is conservatism *in extremis*. For the sake of being able to declare that the uterus

itself has not been removed great risks of consecutive and secondary hæmorrhage, of septic poisoning, of suppuration, and of future intestinal obstruction (one case, No. 7, of Dr. Alexander's died on the fifth day from this cause) are deliberately encountered, in order to preserve a mutilated organ, the future usefulness of which is, to say the least, extremely problematical. In one case (No. 6) 25 growths were removed. What kind of uterus must have been left?

Enucleation, which *a priori* would appear to be an ideal method, is indeed surrounded by so many dangers, immediate and remote, that it becomes a serious question whether it is ever justifiable. A. Martin,¹ of Berlin, in 1890 published 96 cases, with 18 deaths following, due to hæmorrhage or sepsis; amongst the 78 survivors there were two cases of return of growth, whilst a large number suffered within a short time from other and fresh troubles.

Küstner had 22 cases, with 8 deaths; Schauta, 18 cases, with 4 deaths; Czerny, 30 cases, with 7 deaths. Total, 70 cases with 19 deaths—27.1 per cent.

CLASS C.—METHODS WHICH REMOVE THE UTERUS AND TUMOR.

SUB-CLASS A.—VAGINAL HYSTERECTOMY.

Section 1.—Without section of uterus.—Pean's method.

Section 2.—With section of uterus.—I. Landau's method. II. Doyen's method. III. Morcellation.

SUB-CLASS B.—ABDOMINAL HYSTERECTOMY.

Section 1.—Supravaginal Amputation with Extraperitoneal Treatment of Stump.—Hegar.

Section 2.—Supravaginal Amputation with Intraperitoneal Treatment of Stump.—I. Schroeder. II. Gow. III. Baer. IV. Le Bec. V. Kelly.

¹ Weill, Ann. de Gynéc., Paris, July, 1899, p. 32.

Section 3.—Pan-hysterectomy.—I. A. Martin, of Berlin. II. Chris. Martin, of Birmingham. III. Doyen. IV. Schauta. V. Richelot.

SUB-CLASS C.—COMBINED.

Section 1.—Commencing from below.

Section 2.—Commencing from above.

SUB-CLASS A.—VAGINAL HYSTERECTOMY.

Previous careful disinfection of vagina. Shaving of vulva.

Section 1.—Without Section of Uterus.—Pean's Operation.

Technique.—Lithotomy position.

1. Auvard's speculum and two long lateral specula are placed in position.

2. The os uteri is seized by strong vulsellum forceps.

3. A circular or ovoid incision is carried round the cervix through the vaginal mucosa; this incision is relatively nearer to the os in front than behind.

4. With the finger or some blunt instrument the bladder is separated in front and well to either side, the line of separation being kept close to the uterus. A sound in the bladder is useful as defining the thickness of the vesical wall at all points. By this manoeuvre the ureters are freed and carried upwards out of the way.

5. Posteriorly, Douglas' pouch is opened in the same way as high up as possible, so as to leave a well-marked posterior peritoneal flap.

6. When the uterus is thoroughly freed behind and before, it is now held solely by the lateral attachment. Being drawn strongly to one side, the needle (Fig. 27) is taken in the right hand, and, the left forefinger being passed up behind, its point is made to transfix the broad ligament on one side, at about one-third its height from before backwards, so that the point impinges upon the forefinger; the handle being raised, its point appears in the posterior wound. A thread (silk or catgut) being threaded through

the carrier devised by Amenabar, of Chili,—not used by Pean, but mentioned here because of its great usefulness for this purpose,—and the two ends securely held against its handle, the loop so formed is made to lie over the hook in the needle, which is then withdrawn, carrying the thread through the ligament. This is then securely tied, and that portion of the cervix the circulation in which is thereby controlled is freed by the scissors. The same manœuvre is carried out on the opposite side. The freed cervix is drawn down, and a fresh and higher portion of the broad ligament treated in the same way. As each portion of the uterus is freed, the organ becomes looser, and descends more and more, until at last the fundus appears in the vulva, drawing down with it the tubes and ovaries, which are removed or not according as they appear diseased or healthy. Some surgeons dislocate the fundus forwards or backwards in the wound as they proceed, tying the ligaments from above downwards. The uterus is removed.

7. The ligatures on both sides being left long, are drawn down, so as to carry all cut edges below the line of the peritoneum.

8. The surfaces of the wound are exposed by long-bladed retractors, and all vessels still bleeding are seized and tied. The edges of the anterior and posterior peritoneal flaps are exposed.

9. These peritoneal flaps are united by a catgut suture, so as to bring their serous surfaces into contact. Especial care is to be taken at each angle to unite them above the cut ends of the tubes, if these have been left. Pean did not advise this, but subsequent experience has shown the wisdom of the proceeding.

10. The ligatures are now cut short at the knots, or left to come away later, as they become loose. As all raw surfaces are now below the level of the peritoneum in the upper extremity of the vagina, these are now loosely packed with iodoform gauze.

Section 2.—With Section of Uterus.—I. Landau's Operation.

Technique.—Lithotomy position.

1. Auvard's speculum is placed.

2. The os uteri is seized by vulsellum forceps, one at each lateral angle.

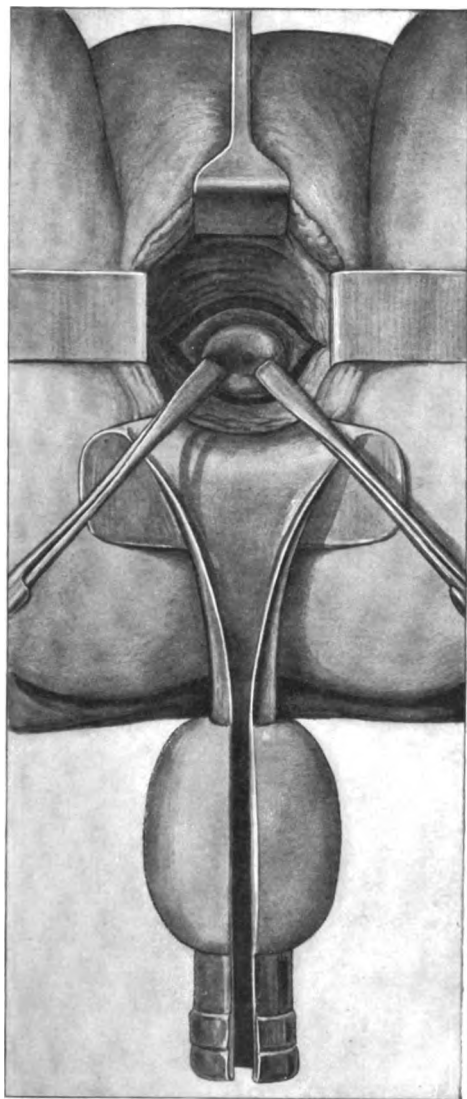


FIG. 26.—VAGINAL HYSTERECTOMY. (FIRST STAGE.)

3. A circular or ovoid incision is carried round the cervix through the vaginal mucosa (Fig. 26).

4. With the finger, the bladder is separated in front, and widely to each side, so as to liberate the ureters, which are carried up with this viscus.



FIG. 27.
1, Ligature carrier (Amenabar, Chili) ; 2, handled needle.

5. Posteriorly, Douglas' pouch is opened as high up as possible, so as to leave a posterior peritoneal flap.

6. The anterior wall of the uterus is split in a median line with the scissors, one blade entering the uterine canal ; tension on the uterine wall being kept up steadily with the forceps, which are drawn downwards and outwards on either side.

7. When the splitting has been carried as high as the portion bared, the finger is again introduced, and the bladder still further freed. Tension by the forceps originally applied being still kept up, a fresh grip is taken as high up on the split edge as possible, and the pull transferred to the new forceps, whilst the first pair is removed. The same thing is done on the opposite side. Fresh splitting, and drawing downwards. At last the fundus appears in the anterior wound (Fig. 28). The splitting may be carried over this and down the posterior wall. If this is done, it is well to leave on or to reapply the first double pairs of forceps to the os as a landmark. When the whole uterus is split mesially, it is usually easy to dislocate the two halves outwards, when each half can be dealt with separately. If the uterus is still too large to permit of its descent, portions can be removed from either side of the central incision, or fibroids so exposed may be enucleated (Fig. 29). Final hæmostasis is always consecutive, bleeding during the first steps being prevented by traction upon the uterine segments and by keeping in or near the mesial line.

8. The broad ligaments can be ligatured from above downwards, or from below upwards, or they may be clamped by Doyen's forceps. I prefer the ligature. Schauta lost seven patient's out of forty when clamps were applied, nearly all the deaths being due to secondary hæmorrhage after their removal. Besides, the portion clamped must necessarily slough, thus delaying convalescence.

9. The ligatures on both sides, being left long, are drawn down, so as to carry all cut edges below the line of the peritoneum.

10. The two peritoneal flaps are united by a catgut suture, so as to bring their serous surfaces in contact. Especial care is to be taken at each angle of the wound to unite them above the cut ends of the tubes, which, with the ovaries, if healthy, are left behind.

11. The ligatures are cut short to the knots, or they are allowed to come away later, as they become loose, and a loose iodoform gauze drain is placed between the raw surfaces left at the top of the vagina, extending into the vagina itself.

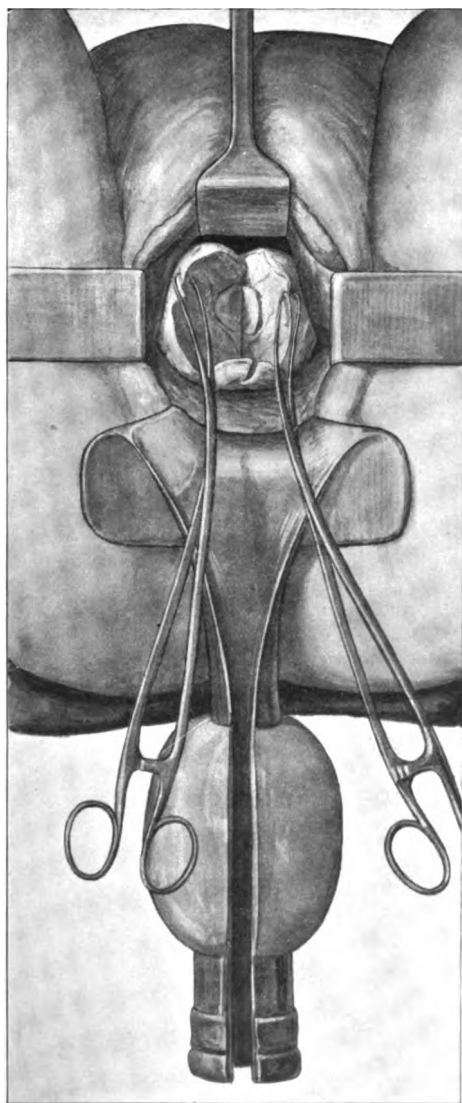


FIG. 28.—VAGINAL HYSTERECTOMY. LANDAU'S OPERATION. (SECOND STAGE.)
The fundus uteri appearing.

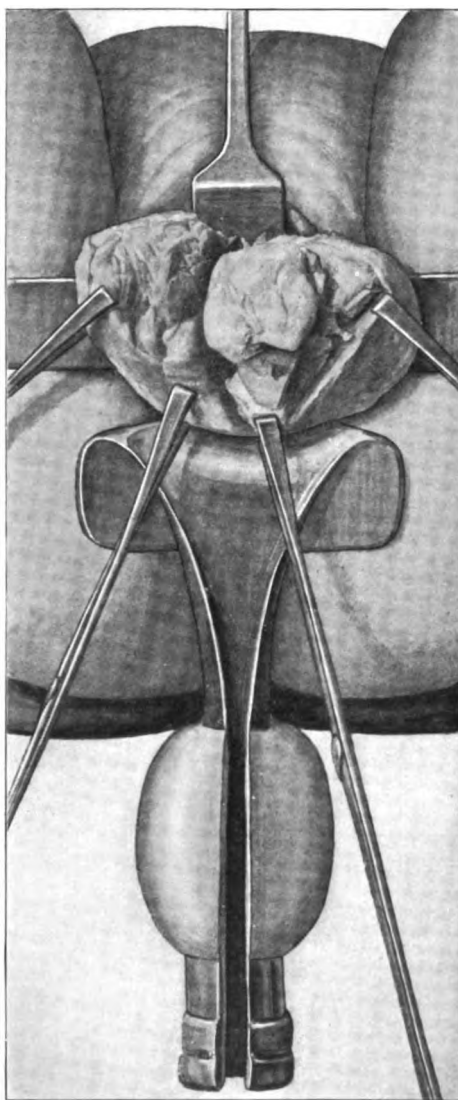


FIG. 29.—VAGINAL HYSTERECTOMY. LANDAU'S OPERATION. (THIRD STAGE.)
Complete median section of uterus. Both halves drawn outside the vulva.

II. Doyen's operation.¹

Technique.—Lithotomy position.

1. Incision of the posterior fornix, opening of Douglas' pouch, and exploration of the pelvic cavity.
2. Incision of the anterior fornix and separation of the bladder.
3. Crushing of the lower and middle thirds of the broad ligaments by his special angiotribe. The crushing forceps (Fig. 38) to be left on fifteen to twenty seconds on either side.
4. The uterus can now be easily drawn down. Anterior hemisection by median or V-shaped incision, and drawing downwards and forwards of uterine fundus.
5. Application of pressure forceps on each broad ligament and separation of uterus.
6. Crushing of upper border of broad ligament and tying of the latter by a single silk thread in the groove formed by the crusher. As the threads are tightened the pressure forceps are cautiously removed.
7. Drying out of pelvis, coaptation of peritoneal flap, and tamponade of the vagina.

If Landau's forceps are applied, they should all be placed so as to grip the tissues in one direction, either all from above down, or all from below upwards. Landau² lays great and legitimate stress on this, as otherwise splitting of the broad ligament laterally, and consequent hæmorrhage, may occur. Should the uterus be too large to remove in this way, it may be greatly reduced in size by shelling out any tumors which the primary incision may traverse, or by morcellation.

III. Morcellation, to be properly performed, requires great care. Traction must be kept up on both sides steadily throughout. Beginning with a median cut with the scissors, wedges, the base uppermost, are to be methodically cut away from the flaps on either side. No piece must be removed until a fresh grip has been taken upon the wall above; traction must be kept up upon

¹ Internat. Congr. Gyn. and Obstet., Amsterd., 1899.

² "Vaginal Radical Operation," translated by Eastman and Giles, p. 214.

the piece to be excised until, with a fresh forceps, a firm hold is obtained upon the part from which it is to be cut. Whilst this is done by the surgeon, an assistant on either side should exercise steady traction upon the lips of the os, where the first incision was made. No section should go within half an inch of the lateral uterine boundaries. All tissue is to be taken away from the central part of the uterine wall. As the fundus is approached, the incisions will pass further outwards, so that the whole gap looks like a half-closed fan; but even here they should not too nearly approach the cornua. Usually much less will be sufficient to permit of the descent of the two halves of the thoroughly divided uterus. Any tumor which requires more than this should be attacked from the abdominal side, or by the combined method.

In the older methods, when the uterus was removed entire, after previous ligature of the vessels on either side the only fibroid uteri which could be removed by this route were comparatively small; the manœuvre of splitting, introduced by Landau, and, still more, the practice of morcellation, has greatly widened its scope, but even now it is not advisable to attack tumors which pass above the median point between pubes and umbilicus from the vaginal side. Schauta says "beyond the umbilicus, and should be capable of being pushed into the small pelvis"; whilst tumors of the broad ligament are usually removed most safely by a combination of vaginal and abdominal hysterectomy. Reynier limits this method to small, freely moveable fibroid uteri, not impacted, easily drawn downwards, and with a wide vagina. Segond thinks that all tumors reaching no higher than the umbilicus may be justifiably removed by this route. Jacobs would limit vaginal hysterectomy to cases in which the tumor does not rise above the pelvic brim. Bumm points out that a wide vagina, a mobile uterus, with the lower pole of the tumor well within reach, are far more important than the actual size of the growth. Weill publishes a list of 48 cases operated upon by this route, with a total mortality of 2.5 per cent.

Landau, 65 cases 2 deaths.

V. Ott, 187 " 3 "

Saenger,	45	cases	3	deaths.
Chrobak,	120	"	5	" last 70 with no deaths.
Léopold,	74	"	2	"
Schauta, ¹	148	"	5	" of which one was a putrid myoma, and another complicated with intestinal stenosis; of the remaining three, two died from secondary hæmorrhage and one from peritonitis.
Zweifel,	19	"	1	death.
Rosthorn,	116	"	1	"
Amann,	59	"	0	"

Reported at the Congr. d'Amster., 1899 :

Jacobs,	79	cases	3	deaths.
Reynier,	53	"	4	" 2 from consecutive hæmorrhage.
Doyen,	42	"	1	death.
Villar,	10	"	0	"
Chris. Martin,	8	"	1	"
My own,	5	"	0	"

In the older operations hæmorrhage was prevented by previous ligature or clamping of the broad ligaments. Landau demonstrated that this was unnecessary and inadvisable, since steady traction upon the uterus was equally effective, and avoided the cramping of space by the presence of forceps in the vagina, whilst if ligatures were used, they could be more easily and effectively applied *after* the division and delivery of the uterus than before.

There seems to be a universal consensus of opinion that vaginal hysterectomy, when it can be performed, is undoubtedly the safest and best operation; my own experience confirms this. The shock is but slight, the control of bleeding perfect, the risk of peritonitis very much less, and the patient becomes very quickly comfortable. How far all this is due to the fact that the worst and most complicated cases—those in which manipulative interference with the surrounding tissues is greatest—cannot be attacked by this route, is doubtful.

At first surgeons were not unanimous as to the necessity of closure of the peritoneum after such an operation; nor, indeed, are

¹ Internat. Congr. of Gyn. and Obstet., Utrecht, August, 1899.

they at present, but sufficient cases are now on record to demonstrate its advisability, apart from *a priori* advantages which such closure entails. These advantages are :

First, the immediate restoration of the peritoneal cavity to its normal condition, that of a closed sac.

Secondly, as peritoneal surfaces unite within twenty-four hours when placed in apposition, all discharges from the raw broad ligaments must, after this period, find their way outwards ; they are blocked off completely from any passage upwards. Bowremann Jessett claims that by simply drawing down the peritoneal flaps by traction on the sutures, and judicious packing with gauze, he accomplishes the same thing without suture. Whilst recognising and welcoming this probable result in cases where the operation has already consumed some time,—and, the patient becoming exhausted, time is of importance,—I confess that I feel safer and more certain of the result after placing the suture.

Thirdly, the apposition of a smooth continuous peritoneal surface to the intestines above, so minimising the chance of later adhesions, which may produce kinking and acute obstruction of the gut.

Fourthly, the prevention of hernia of the small intestine.

That these dangers are not merely theoretical will be seen from actual cases recorded in which peritoneal union was not practised. (See p. 148.)

SUB-CLASS B.—ABDOMINAL HYSTERECTOMY.

Section 1.—Supra-vaginal Amputation of Uterus with Extraperitoneal Treatment of Stump.—*La méthode extra-peritonéale d'Hegar.*

Hysterectomy of Keith, Thornton, Meredith, Bantock, Kæberle.

Hegar's Operation.—

Technique.—Dorsal position.

1. Long abdominal incision in median line.
2. Delivery of uterus and tumors.
- 3. Stripping down of bladder.

4. Application of clamp or Kœberle's serre-nœud around cervical portion of uterus as low as possible.
5. Passage of pins through cervix above serre-nœud.
6. Removal of uterus and tumors sufficiently above pins to prevent retraction of stump out of the grip of the clamp.
7. Closure of abdominal wall down to stump.
8. Application of cautery, persulphate of iron, or tannin to raw surface of stump with a view to mummification. Some surgeons united the parietal peritoneum all round to the peritoneum covering the stump below the clamp.

Many surgeons introduced a glass drainage-tube into Douglas' pouch above and behind the stump. Schauta ¹ now only practises this method in exceptional and urgent cases. He reports 78 cases with 13 deaths (= 16.6 per cent.), of which two were from pneumonia, one from fatty cardiac degeneration, and one from rupture of a pyosalpinx with peritonitis.

Weill ² gives the following list :

Hegar,	22 cases	10 deaths.
Leopold,	34 "	7 "
Fritsch,	60 "	8 "
Fehling,	52 "	6 "
Hauck,	73 "	17 "
Czerny,	30 "	7 "
Schauta,	74 "	13 "
Elisher,	17 "	4 "
Albert,	30 "	1 death.

392 cases 63 deaths. 18.6 per cent.

Cullingworth ³ reports 10 cases with 2 deaths—one from shock, one from septicaemia, the tumor being gangrenous. He abandoned the operation in 1893.

Of the eight which recovered, one cannot be traced, two were noted seven years after, as having no sequent hernia. One of these had a strong scar and had been in full work as a nurse ever since. The rest all suffered from hernia in various degrees.

¹ Internat. Cong. Gyn. and Obst., Amsterdam, 1899.

² Ann. de Gynéc., Paris, 1899, Vol. 52, p. 28.

³ Private letter.

Buchel (Bale), 1890, gives 132 cases by Hegar, Kaltenbach, Fehling, and Fritsch, with 2.9 per cent mortality.

Hauck's latest list gives 308 cases, with a mortality of 8.7 per cent. (Czerny, Runge, Leopold, Olshausen).

Olshausen¹ believes this method is now finally abandoned.

Section 2.—Supra-vaginal Hysterectomy with Intra-parietal Treatment of the Stump.—Intraperitoneal method of Schroeder. Retroperitoneal of Zweifel and Chrobak. Subperitoneal method of Heywood Smith, Byford, Doran. Method of Le Bec, Baer, Hystero-myomectomy of Kelly.

I. Schroeder's Method.²

Technique.—1. Open abdomen. Median line.

2. Doubly ligature each infundibular pelvic ligament with spermatic vessels.

3. Divide between ligatures.

4. Repeat process with round ligaments, which are usually hyperplastic.

5. Separate tumor from surrounding tissue.

6. Place rubber ligature around base.

7. Cut away tumor and uterus above ligature. Catch stump with vulsellum before division is complete.

8. Cauterise cervical canal with 10 per cent. solution of carbolic acid.

8 a. In earlier directions the upper extremity of the stump was transfixed and ligatured.

9. Unite divided surfaces near to mucous membrane. If necessary, cut away sufficient tissue to produce the desired wedge shape of the stump.

10. Cover these with several rows of other sutures, uniting the walls of the stump.

11. Unite peritoneum over the stump by a line of closely placed sutures. On the sides of the stump, at the spots where the large blood-vessels have been divided, and on which the peri-

¹ 8th Cong. Germ. Gynæc., Berlin, May, 1899.

² Brit. Med. Journ., Lond., Vol. 2, p. 714.

toneum covers the stump but loosely, the tissues are firmly fastened to the stump by a separate deep suture.

12. Remove rubber ligature.

Schauta had two deaths out of three cases, and considered the frequent occurrence of exudation, and the possibility of malignant degeneration of the stump, of far too great importance to be overlooked. Several cases are recorded by Jacobs, Kaufmann, and others in which this degeneration actually took place some time after the operation.

Treub reports 57 operations with 5 deaths—8.7 per cent. (avec reduction du pedicule).

Leopold estimated the mortality of supra-vaginal hysterectomy with external or internal treatment of the stump at about 21 per cent.

Terrier, with external treatment, had a mortality of 39.4 per cent. Second, 45 per cent.; with internal treatment, 50 per cent.

The mortality of supra-vaginal amputation is given by Noble, from 345 cases operated on by Kelly, Baldy, Penrose, Boldt, and himself, at 4.9 per cent.

In 806 cases collected by J. Olshausen the mortality was 5.6 per cent.

II. Gow¹ modifies this operation to some extent :

1. Abdominal incision.
2. Tumor drawn out, if practicable, at this stage.
3. Ligature each round ligament on a level with the os internum.
4. Mark out anterior peritoneal flap with a knife sufficiently high to allow of a large anterior flap.
5. Divide round ligaments on uterine side of ligature.
6. Divide anterior layer of broad ligament with scissors, carrying incision up towards middle of Fallopian tubes.
7. Strip down anterior flap.
8. Tie ovarian vessels, including Fallopian tube, so that at least one ovary is left.

¹ Med. Press and Circ., Lond., 1900, Vol. 1, p. 129.

9. Divide broad ligament on uterine side of ligature. Clamps may be used to the uterine side of the divided tissue.

10. Mark out posterior flap with knife and dissect downwards for a short distance.

11. Seize uterine arteries with pressure forceps at level of os internum.

12. Cut away tumor with a knife, seizing and drawing up the stump with vulsellum forceps.

13. Tie uterine arteries.

14. Insert precautionary ligature by thrusting handled needle armed with silk through the stump from before backwards, avoiding the peritoneum, so as to include the outer growth of the stump. This on both sides; this is to include vessels given off obliquely, and controls oozing or spurting vessels from the stump surface. These ligatures pass through and include uterine tissue. Or,

15. Encircle the bleeding area with a ligature passed by a Hagedorn's needle.

16. Put in two antero-posterior sutures through the muscular surface of the stump, avoiding the peritoneum, so as to roll the raw surface together.

17. Unite peritoneal flaps.

18. Cleanse peritoneum and close abdomen.

He gives a list of 47 operations with one death; mortality of 2.1 per cent.

III. Prof. B. F. Baer's operation.

This was introduced in order to avoid the ligature of the cervix itself, either temporary or permanent, and so to avoid bruising or exsanguination of any part of the structures left behind. As will be seen, however, Schroeder did not, in 1883, advise permanent ligature of the cervix, and Baer himself used catgut ligatures, introduced so as not to occlude the cervical canal, but which would yet strangulate some portion of the tissues, if, after ligature of the uterine arteries, the surface of the stump was not dry.

His *technique* is: Trendelenburg position. Abdominal incision. Adhesions separated. Delivery of tumor.

Large gauze pad placed behind and below.

A single silk ligature is passed through the broad ligament near the cervix, which, being tied, controls the ovarian artery and veins.

The ligament is then severed just below the tube and ovary, the incision being carried close to the cervix.

The knife is then run lightly across the lower segment of the uterus, an inch or two above the peritoneal reflection of the bladder, care being taken to incise the peritoneum only.

The bladder is then stripped down with the handle of the scalpel.

The uterine artery is then tied, just outside of, but close to, the cervix on both sides.

The cervix is amputated just above the vaginal attachment.

A small posterior fold is formed by stripping up the peritoneum while the amputation is being made.

The stump is now held in the grasp of a small tenaculum forceps.

If the main arterial branches have been properly ligated the raw end of the cervix will be found dry. If any vessels should spurt, they must be tied. If general oozing is seen, catgut sutures which do *not* include the peritoneum should be passed through the cervical tissue to control it. Oozing is very rare in non-pregnant cases.

The suture should be placed on each side of the cervical canal, so as not to occlude it. When all bleeding has ceased, the peritoneal folds are closely adjusted over the stump and as many Lembert sutures are placed as are necessary to maintain this *close* adjustment. Nothing whatever is done to the cervical canal if the tissues are in a healthy state. After toilette of the peritoneum the abdominal incision is closed and dressed in the usual way.

This operation appears to be the favorite at the present moment. Dr. C. J. Cullingworth sends a list of 71 cases, with 20 deaths, operated upon in this way; Dr. Mary Scharlieb, a list of 39, with 4 deaths. At a recent meeting (February, 1900) of the British Gynæcological Society, Mr. Bowremann Jessett expressed his present preference for this method, although previously an advo-

cate of pan-hysterectomy, and this opinion appeared to be shared by most present. At a discussion on this subject at the Leeds meeting of the North of England Gynæcological Society, March, 1900, a similar opinion prevailed. Mr. Alban Doran writes also in favor of it, although he admits that in some cases the sutures came away about six months later.

The results of this are still unsatisfactory, for pus or exudates are apt to form at the upper extremity of the stump, between it and the peritoneal covering. Dudley and Goffe reported cases in which pus had to be evacuated from this position by dilating the cervix. Eastmann and Chrobak¹ burnt a way through the cervix, putting in a gauze drain. Dr. Mary Scharlieb sterilises the cervical canal by painting the mucous surfaces with pure carbolic acid; then sews the muscular portions together, obliterating the canal, subsequently sewing over the stump the flaps of peritoneum which she has previously dissected from the anterior and posterior surfaces of the tumor.

The next method was that of Le Bec, who, after amputation of the tumor, split the remaining cervix, and removed as much as possible from either half, leaving two small stumps, one on either side; these were drawn down into the vagina by the ligatures around their bases, and the peritoneal folds united above.

IV. Le Bec's² operation.

Technique.—Abdominal cœliotomy. Fibroma drawn out, adnexa raised up and stretched upwards and outwards. A clear space in broad ligament found. Through this, two stout silk threads are passed. One is tied outside the ovary, so ligating the ovarian vessels. The second is tied over the Fallopian tube near the uterus to prevent return hæmorrhage. Broad ligament divided between. Both round ligaments separately ligated. Bladder dissected down to vagina. This done by incision of peritoneum on anterior surface of fibroma, so as to form a peritoneal flap. Mass may be diminished by now placing an india-rubber tube

¹ Thornton's Art. "Hysterectomy," Allbutt and Playfair's Gyn., p. 624.

² Brit. Med. Journ., London, 1896, Vol. 2, p. 1293.

round the lower portion of the fibroma and removing the upper portion.

Or the tumor is drawn upwards over the pubis, and a long curved forceps inserted into the vagina so that when opened from 2 to 3 cm. it stretches the posterior fornix. Through this a small incision is made into the pouch of Douglas. The incision is widened by opening the forceps.

The tumor is drawn back, the forceps placed so as to protrude the anterior fornix, and the latter treated in the same way. Care must be taken not to move the tumor to one side, so as to avoid wounding the large uterine veins.

The forceps is made to seize one end of a long silk thread, passed from above, to carry it into the vagina and bring it up again through the opening in Douglas' pouch. Another thread is similarly applied on the opposite side. Both are tied, so controlling the uterine arteries. The surgeon now cuts the tumor horizontally just above the ligatures and only leaves pedicle. Pedicle is cut mesially downwards, and as much is cut away from each side as possible, leaving sufficient to hold ligatures. The long ends of these are now seized by the forceps in the vagina and drawn down. The two peritoneal flaps are sutured with catgut. The abdomen is closed. Ligatures removed fifteenth day. A drainage-tube is left in vagina through which daily injections are made.

He reports 40 cases with 4 deaths—2 due to septic peritonitis, one of mercurial poisoning one month after, one of syncope during the night following operation.

V. Kelly's hysteromyomectomy, or the American operation, falls into this category, since in it also the cervix is left behind. The main difference between this and other operations of a similar kind consists in the lateral separation of the uterus and tumors from the surrounding tissues. In all others, separation is done equally from both sides, progressing from above downwards. In pan-hysterectomy, also, progress is uniform on both sides, either from above downwards, as in Martin's operation, or from below upwards, as in Richelot's and Doyen's. In the American method

one side is loosened from above downwards, but the other from below upwards. Whilst in this method, as described by Kelly, the cervix is cut across and left, there is no reason why the principle involved should not be applied to cases of entire removal. This rolling out of the uterus from one side, whether the cervix is removed or not, is a manœuvre of special value in cases of intraligamentary fibromyoma. Beginning on the side least complicated, the uterus, loosened below, is rolled up and out, on to the affected side, whilst the uterine artery on that side is tied below, and any other structures, as the ureter, which may have been displaced by the development of the tumor, tend to slip away out of the line of separation, which is, of course, kept close to the outline of the growth.

Technique.—Trendelenburg position.

1. Abdominal section.
2. Delivery of the tumor. If impacted in the pelvis, pressure upwards in the axis of the superior strait from an assistant's fingers in the vagina will often greatly assist.
4. Ligature of ovarian vessels and round ligament on one side, a clamp being placed internally to this. Division between ligature and clamp.
5. Division of anterior peritoneum from one round ligament to the other.
6. The uterus is pulled upwards, whilst the bladder is detached downwards, with a sponge, baring the cervical end almost or quite down to the vaginal junction. This brings into view the uterine arteries and veins. If not sufficiently exposed, the uterus is drawn forwards, and the sharp posterior peritoneal margin behind the cervix is divided.
7. Ligature of uterine arteries and veins on this side by curved needle, passed beneath them and close to the side of the uterus.
8. The uterus is drawn over to the opposite side and the uterine vessels are divided 6 to 10 mm. above the ligature. The cut vessels on the tumor side are clamped.
9. The uterus is cut across just above the vaginal junction. As soon as the cervical canal is cut across a pad of gauze is placed

beneath the upper cut surface, to prevent intra-uterine discharges from escaping on to the wound, and the canal below is wiped out.

The present writer, believing that in all cases the cervix is better removed in its entirety, modifies this operation by previously plugging the cervix from below, after disinfection, with gauze. At the point now reached he introduces, by an assistant, a strong curved forceps into the vaginal lateral cul de sac, and, this being made to project, he cuts down upon it and enters the vagina. With the scissors the vaginal wall is then snipped through all round the cervix, which then is bodily lifted up with the rest of the uterus and rolled over towards the opposite side. As the cervix would be in the way of the future steps, it is seized by strong forceps and pulled up against the free surface of the uterus. It usually bends up quite easily, and can be controlled by the hand which is pressing the uterus over, and is thus kept quite out of the line of future work. Being plugged, its secretions give no trouble. The sharp kink also produced at the neck aids in preventing any escape. Moreover, it gives another and still better placed point for traction laterally (Fig. 30).

10. In cutting across the remaining half of the cervix Kelly cuts upwards when near the edge for 1 or 2 cm., so as to leave a thin shell of cervical tissue, and to expose the opposite uterine vessels at a higher level, where it is easier to tie them without risk of including the ureter.

In the present writer's method the strong traction upon the cervix puts on the stretch the peri-cervical tissue on this side, which is divided close to the cervix, and permits the tying of the uterine vessels at any height which may be wished.

11. The uterine vessels are clamped and divided, the uterus rolled still further over, the round ligament clamped and cut through; finally, with still more traction, the ovarian vessels come into view, are clamped and cut, and the whole mass becomes free.

When an intra-ligamentary fibroid is present, it will shell out with surprising ease, but requires still more rolling out than usual, and occasional division of strands of connective tissue by the scissors. These must be applied with scrupulous care to the surface

of the tumor. The ureter, if displaced downwards, is often not seen, as it retracts away from the tumor, as this rotates ; whilst if displaced upwards, it slips over the smooth upper and outer surface of the fibroid, as the latter is rolled out from beneath it, and falls into its normal position. Great care, however, is necessary in the early stages, in such cases, to free the bladder completely in front, or the ureter will be dragged up with the tumor, and be in danger of division.

12. All clamped vessels are now tied. Kelly ties all important vessels twice—once during the enucleation, and again after it is completed.

13. All bleeding being most carefully controlled, the stump is closed over the cervical canal by three to five or more catgut sutures passing in an antero-posterior direction, and tied as passed. These sutures do not include the mucous membrane.

14. The anterior peritoneal flap is drawn over the stump and united by a continuous catgut suture to the posterior peritoneum, the round ligaments and the pedicles of the ovarian vessels being turned in between the layers of peritoneum. The suture starts from one ovarian pedicle and is continued right across the pelvis to the other. If a large space has been left in the cellular tissue, it is best to unite the peritoneum with interrupted or mattress sutures so that any blood may run into the peritoneum and be absorbed instead of forming a hæmatocele.

If the present writer's views and practice are adopted, such cavity in the broad ligament presents no difficulties, as drainage is then free into the vagina. I modify the last two steps in this way.

All bleeding being most carefully controlled, a curved forceps is passed up the vagina and made to appear in the abdominal gap left by removal of the uterus. This forceps is then made to seize one end of a roll of gauze, introduced through the abdominal wound, and draws it down into the vagina until its upper extremity is just beneath the level of the peritoneum, which is then carefully united over it by a suture placed as Kelly directs. Any excess of gauze is cut off below. The peritoneal cavity is then closed above by tier suture without drainage.

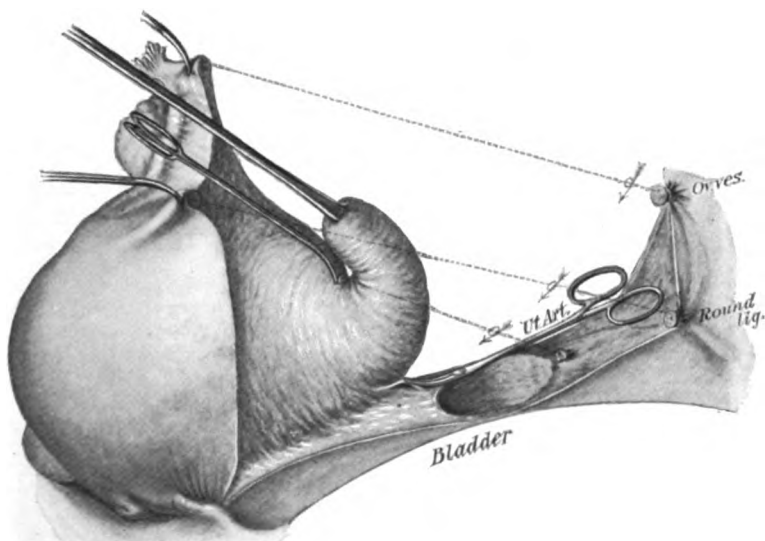


FIG. 30.—AUTHOR'S MODIFICATION OF THE AMERICAN OPERATION.
 (Modified, by permission, from Kelly's Operative Gynæcology.)

15. The abdomen is closed without drainage.

Kelly reports 100 cases with 2 deaths.

The mortality of supra-vaginal amputation is given by Noble, from 345 cases operated on by Kelly, Baldy, Penrose, Boldt, and himself, at 4.9 per cent.

In 806 cases collected by I. Olshausen the mortality was 5.6 per cent.

Section 3.—Pan-hysterectomy.

I. A. Martin's¹ (of Berlin) method.

Dorsal position.

Median incision, large opening.

Tumor drawn out; if necessary, with previous enucleation of masses after splitting their capsule, so as to render the whole tumor more moveable.

Ligature of infundibulo-pelvic ligament.

Division of broad ligament after ligature until the cervix is reached.

Commencement usually from the left side, but in all cases from that which is recognised as the most complicated.

One side completely ligatured before attacking the other, a Richelot's clamp forceps being applied on the uterine side of the line of ligature.

Between these two, the broad ligament is divided down to the cervix.

The uterus, being thus freed, can be brought over the symphysis pubis.

The posterior fornix is then cut through by scissors close to the cervix and the two edges of the wound are united by sutures. Sometimes a bent forceps is passed from below into the vagina, and made to bore through the posterior fornix into Douglas' pouch, which by expansion tears the opening bloodlessly and is useful later to draw down the ends of the ligatures into the vagina.

The first finger of the left hand is passed into the vagina from

¹ Berl. klin. Wochenschr., 1895, July 22, p. 625.

above, and, under its protection, a ligature is passed by a needle around the lowest attachment of the broad ligament on the one side, which is then divided.

The os is now seized from behind with a Museaux forceps, which at once both closes the cervical canal and draws the cervix upwards and backwards into the peritoneal cavity.

The opposite side of the broad ligament can now be easily secured in a similar manner.

The anterior vaginal fornix is now divided, and with it the firmer bands of connective tissue usually met with in this situation.

When these are cut through, the cervix separates easily from the bladder, without the need of any force, only requiring section of the peritoneal layer above.

The tumor and uterus being removed, all bleeding is stopped by ligatures, or, if necessary, by continuous suture.

The ends of ligatures are placed between the jaws of the forceps in the vagina, and drawn through into it.

The peritoneum is then united by suture from right to left over the vaginal wound.

The wound in the abdominal wall is closed. No drainage.

Martin reported 81 cases with 6 deaths—2 from embolism and pneumonia, 3 from peritonitis, and one from unexplained collapse on the fourth day (secondary hæmorrhage?).

II. Christopher Martin's ¹ (of Birmingham) method.

Technique.—Dorsal position.

1. Median incision long enough to allow easy delivery of tumor.
2. Large gauze pads are packed into the abdomen above and behind the tumor.
3. A double thread is passed through the broad ligament at a point free from veins, about the junction of the upper and middle thirds of the ligament, and midway between the uterus and pelvic wall. The two ligatures must not interlock. By pulling the one forcibly inwards, and the other outwards, the aperture of the puncture is stretched or torn into a transverse slit about one inch

¹ Birm. Med. Rev., 1896, p. 142.

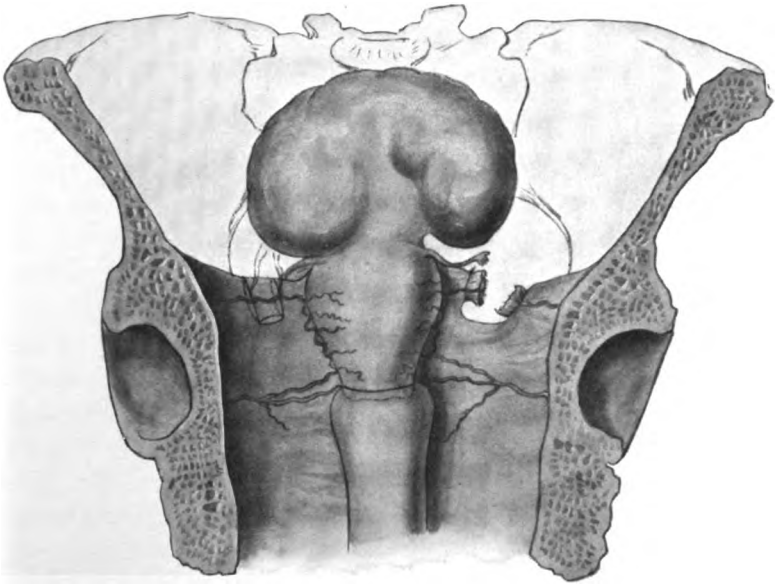


FIG. 31.—ABDOMINAL PAN-HYSTERECTOMY. (FIRST STAGE.)
On the left side, two ligatures embracing the ovarian artery are placed on the right side; these are tied, and the tissues divided between.

in length. This slit may be made also by opening a pair of forceps passed into the aperture of puncture. The two ligatures are tied as far apart as possible and the intervening broad ligament is divided. This is repeated on the opposite side (Fig. 31). He prefers to remove ovaries and tubes with the uterus, and hence the outer or proximal ligature should be tied outside the ovary and Fallopian tube. (In a later private communication, July 20, 1899, he writes: "I now always endeavour to leave at least one ovary, unless both are obviously diseased, or unless there are mechanical difficulties in the way. Sometimes there is not room to tie the upper ligatures on the uterine side of the ovaries, and then one is compelled *nolens volens* to remove both." He also says: "I generally now begin from the vagina, and separate the cervix as far as is practicable from the surrounding tissues. I then open the abdomen from above, and complete the operation." Thus bringing this operation into the next category—that of the combined method, which is described later.)

4. A double ligature is passed through the broad ligament about the level of the internal os, and nearer to the uterus than the first ligature. The aperture of puncture is again stretched, and the ligatures are tied as far apart as possible, the intervening tissue being divided. This is repeated on the opposite side (Fig. 32).

5. The bladder is next detached from the anterior surface. A sound passed into the bladder will define its upper edge. Moreover, the line of union can be defined as a whitish line, above which the peritoneum is firmly, below loosely, attached. A curved incision is made $\frac{2}{3}$ of an inch above this from one broad ligament to the other. The bladder is peeled down. The surgeon can tell when he has reached the vagina by feeling for the tip of a pair of forceps introduced into the vagina and pressed up into the anterior fornix. The vagina is opened upon this with scissors close to the cervix, and the opening enlarged. The posterior fornix is similarly opened.

6. If the ureters are seen, they are pressed outwards. The uterine arteries remain to be tied. The needle is passed on the uterine side of the ureter, but must leave enough tissue between it

and the uterus to avoid slipping of the ligature. With the left forefinger, passed into the vagina from behind, the needle is guided close above the mucous membrane of the lateral fornix. These ligatures are single, and are tied on both sides before the uterus is freed from either.

7. The uterus is now cut loose, keeping the scissors as far as possible from the two lower sutures, and is lifted out.

8. The cut edges of the vaginal wall are seized with forceps, drawn upwards, and inspected. Any bleeding points are tied.

9. The pelvis is sponged clear of clot, the raw surfaces inspected, and any bleeding points ligatured. All ligatures are cut short or (later communication) used to draw them down into vagina (Fig. 33).

10. A thick roll of iodoform gauze is drawn through from the abdomen into the vagina, leaving about one inch projecting into the peritoneal cavity. Makes no attempt to close the vaginal canal.

11. Abdomen is closed by interrupted silkworm-gut sutures; no drainage-tube unless there have been extreme adhesions and much oozing.

12. Vaginal gauze is removed on fifth or sixth day, followed by gentle syringing night and morning.

13. Uses catheter every six hours for first four days.

III. Doyen's ¹ method.

Total abdominal hysterectomy, with subserous decortication.

Technique.—Trendelenburg position.

1. Abdominal section.

2. Tumor lifted out of pelvis and drawn forwards over the pubis.

3. A long curved forceps, passed into the vagina, is made to project into Douglas' pouch. Cutting down upon this opens the vagina.

4. Through the posterior opening the cervix is seized, by the anterior lip if possible, with a special forceps (or *érigne*, Figs. 34

¹ Ann. de gyn., Paris, 1899, Aout, p. 209.

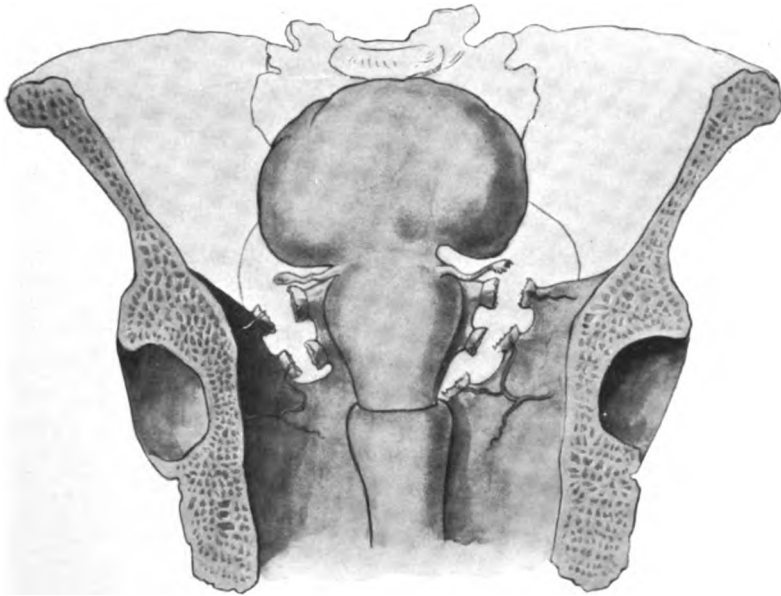


FIG. 32.—ABDOMINAL PAN-HYSTERECTOMY. (SECOND STAGE.)
The bladder has been separated, and the broad ligament ligatured down to, and into, the vagina.

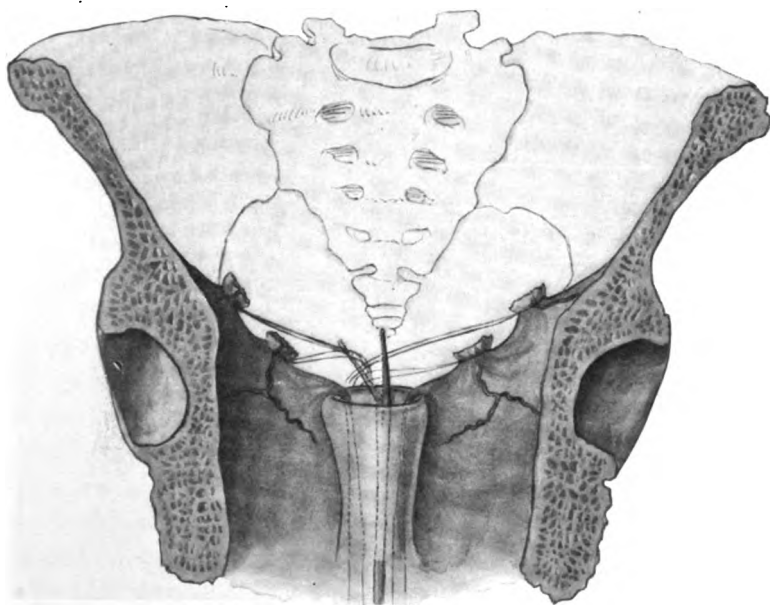


FIG. 33.—ABDOMINAL PAN-HYSTERECTOMY. (THIRD STAGE.)
 The uterus, with its cervix, has been removed. A crocodile forceps, passed through the vagina, grasps the threads of the ligatures on both sides, left long for this purpose, and, by traction upon these, draws the parietal pelvic peritoneum towards the central opening.

and 38) and drawn upwards and backwards. The left index-finger being passed into the vagina from behind, the vaginal attachments are divided upon it all round by scissors and the cervix separated from the bladder by upward traction (Fig. 36).

5. The right broad ligament is seized by an assistant's thumb and finger and divided on its uterine side; the tumor is turned over and the left broad ligament treated in the same way. The section is carried so close to the uterus that the main trunks of the vessels are not divided, but only their internal branches (Fig. 37).

6. The pedicles of the adnexa are crushed, tied, and divided.

The uterine arteries are also tied and the forceps removed. Crushing is done by a special forceps designed by Doyen (Fig. 38).

7. The vaginal mucous membrane is united by two or three sutures with the peritoneum, the ends of the ligatures on the arteries are drawn down into the vagina, and the pelvic peritoneum is united by a purse-string suture across the pelvis so as to turn the adnexial stump below the peritoneum. This is followed by a second continuous suture across from left to right.

8. The peritoneal cavity is dried out and the abdominal wall is closed in two layers—silk for the peritoneum and fascia, horsehair for the skin. Reynier had 7 cases with one death. Doyen reports 60 operations with a mortality of 2.6 per cent. (Cong. d'Amster., 1899.)

Macnaughton Jones¹ lays stress on the necessity of not trusting to crushing alone, but to ligature as well.

IV. Schauta's method.

Technique.—1. Abdominal incision.



FIG. 34.—DOYEN'S ERIGNE.

¹ Dis. of Women, p. 460, edit. 1900.

2. Eventration of the tumor.
3. Broad ligaments are secured on either side by forceps, two on each side, division between.
4. Section of anterior serosa and detachment of bladder as far as the vagina.

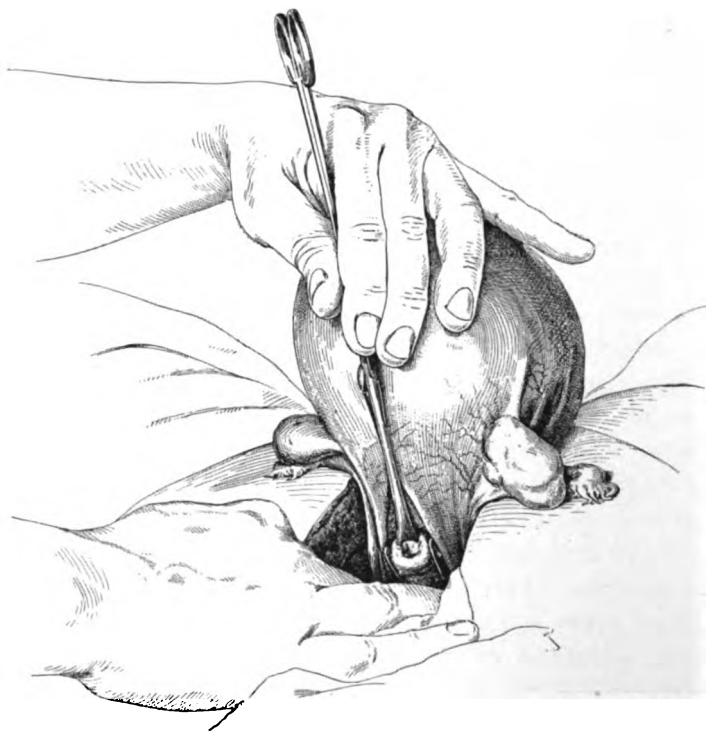


FIG. 35.—DOYEN'S ABDOMINAL HYSTERECTOMY. (FIRST STAGE.)

The posterior wall of the vagina has been opened, and the os uteri seized and drawn backwards and upwards.

5. The parametria are clamped quite near the uterus. Two clamps are placed, right and left of the lateral vaginal pouches, and the vagina is opened right and left.
6. The tumor is now held by a narrow bridge formed by the anterior and posterior vaginal walls. These are secured by two curved clamps and the uterus is freed.

7. Ligatures are substituted for the clamps, and are left long and turned into the vagina for drainage.

8. The peritoneum of the bladder is united with that of the posterior vaginal wall.

V. Richelot's method.

Technique.—1. Abdominal section.

2. An anterior peritoneal flap is made, separating off the bladder.

3. The uterine arteries are found and are clamped by forceps.

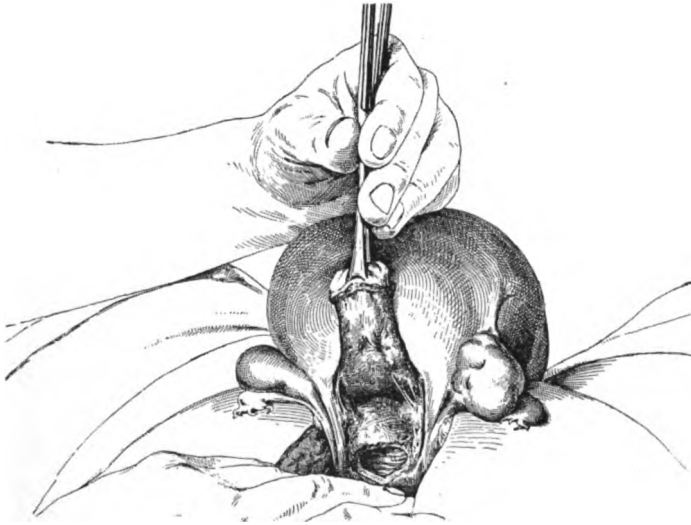


FIG. 36.—DOYEN'S ABDOMINAL HYSTERECTOMY. (SECOND STAGE.)

By upward and backward traction, the cervix is peeled off from the bladder in front—subserous decortication.

4. These are cut close to the uterus.

5. The anterior cul de sac is opened, the cervix seized and drawn upwards and forwards.

6. The vaginal attachments are circularly divided.

7. The broad ligaments are separated from below upwards, a series of catgut ligatures being placed as they are severed; this separation upwards is especially useful if there is any disease of the appendages with adhesions.

8. All vessels previously clamped are now tied.

9. The vaginal wound is sutured with catgut.

Jonnesco¹ does a similar operation. It will be seen that this method is practically the counterpart of that of Doyen, who

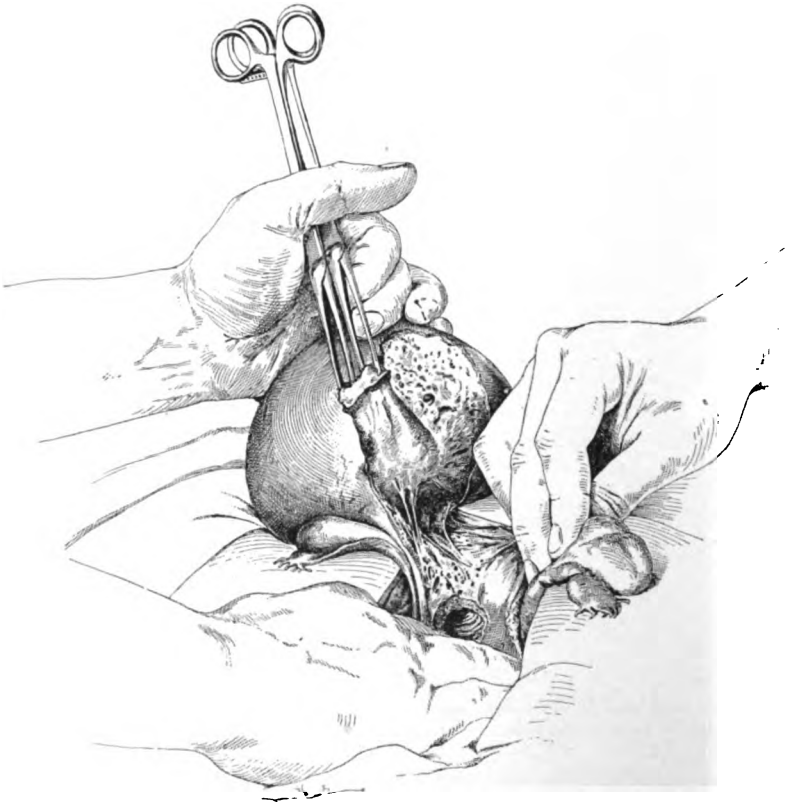


FIG. 37.—DOYEN'S ABDOMINAL HYSTERECTOMY. (THIRD STAGE.)

The uterus being free in front and behind, an assistant's hand grasps the broad ligament on one side, whilst the uterus is cut loose from that side.

brings the cervix up posteriorly through Douglas' pouch, whilst Richelot and Jonnesco bring it up anteriorly between the bladder and the body of the uterus.

¹ Ann. de Gyn., 1899, Aout, p. 240.

Jonnesco, however, makes a point of tying vessels alone, and not masses of connective tissue with them, as previous operators have done. Hartmann ¹ also lays stress upon this. He closes

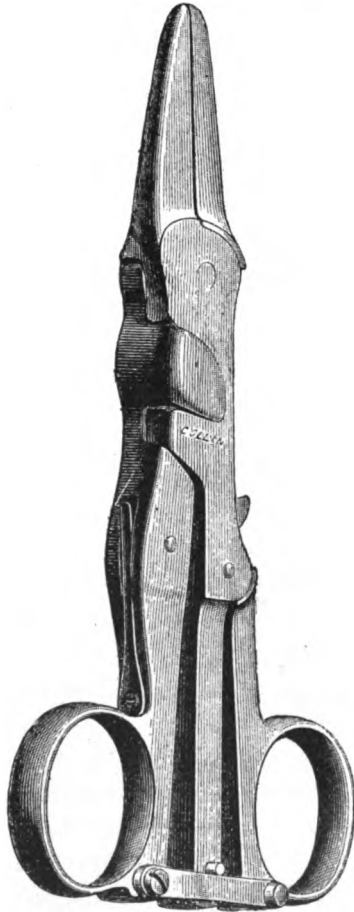


FIG. 38.—DOYEN'S BROAD LIGAMENT CLAMP, OR CRUSHING FORCEPS.

both vagina and peritoneum, and uses vaginal drainage only when the pelvic asepsis is doubtful, or large surfaces have been denuded of peritoneum. Duret ² (Lille), in such cases, usually following

¹ Ibid., p. 247.

² Ibid., p. 151.

broad ligament growths, sometimes closes the peritoneum above, so as to form a diaphragm, the vagina below, and makes an opening below the peritoneum, but above the pubis, for drainage, the cavity between being filled with gauze.

Pestalozza¹ has operated by total abdominal hysterectomy 82 times with 3 deaths, one of which was due to pneumonia, and another to tubercular ulceration of the intestine.

In 100 cases of total hysterectomy reported by Polk and Boldt the mortality was 10 per cent. In 520 cases collected by Olshausen the mortality was 9.6 per cent. Mr. Chris. Martin sends a list of 35 cases, containing one death, or a mortality of 2.8 per cent.

SUB-CLASS C.—THE COMBINED METHOD.

Section 1.—Author's Method in Severe Cases.—Commencing from Below.

Technique.—Lithotomy position.

1. Auvard's speculum. Lateral retractors.
2. The uterus is seized by vulsellum forceps and drawn downwards.
3. The cervix is cleansed and packed with gauze. If there is much discharge, the lips of the os are sewn together over this.
4. A circular or ovoid incision is carried round the cervix through the vaginal wall, which should be thoroughly divided all round. It is thicker than it appears.
5. With the finger, keeping close to the uterine wall, the bladder is to be separated from the anterior uterine wall well to either side. The probability is that, if the tumors are large, or very excentrically placed, this separation cannot be carried very far up. As far as it goes, however, it should completely free the uterus on either side, and it should pass sufficiently high up to permit of access to the uterine arteries and veins.

Posteriorly, 'Douglas' pouch is opened. With one finger behind, and the thumb in front, the uterine artery is defined, and a liga-

¹ Ibid., p. 239.

ture passed round it on either side. This is tied and the uterus is cut away as far as the ligature extends. It is now held by the upper half or two-thirds of each broad ligament and the upper portion of the vesico-uterine attachment.

7. All bleeding points are tied and a loose gauze pad is inserted.

The patient is placed in the Trendelenburg position and the surgeon's hands are re-sterilised.

8. The abdomen is opened through the rectus sheath of one side, *not* through the linea alba.

9. All adhesions to omentum, intestine, etc., are tied and freed, and a large gauze pad placed in Douglas' pouch, so as to cover the intestines, which now gravitate away from the operative field.

10. If the ovaries and tubes are healthy, they are to be left. If diseased, part, at least, of one ovary is to be retained. If healthy, the ovarian ligament, Fallopian tube, and round ligament are embraced in one ligature, applied through the broad ligament at a point free from vessels, below those in the angle below the uterine cornu, as near to the uterus as will permit of sufficient tissue being left to prevent slipping of the ligature. This is repeated on the opposite side, and these structures are then divided close to the uterus. If necessary, clamps are applied to the uterine side.

11. A curved incision is carried across from one incision to the other at least half an inch above the line of the bladder, which is then stripped down until the previous separation from below is reached. The uterus is now only attached by the central portion of the broad ligament on either side.

12. A ligature is applied around these attachments on either side, and tied. The uterus is cut away and removed.

13. All bleeding points are tied and ligatures cut short.

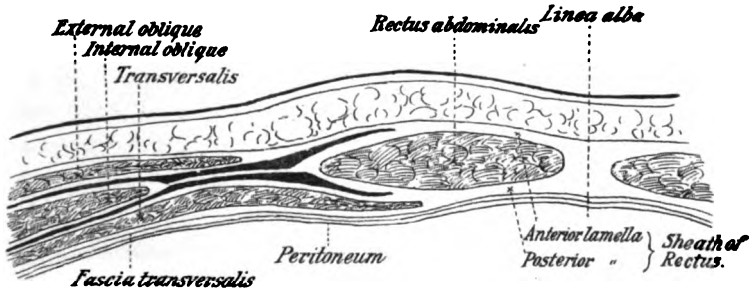
14. The pelvis is dried out, the gauze pad in Douglas' pouch removed.

15. A roll of iodoform gauze is pulled through into the vagina from above, its upper extremity lying immediately *below* the peritoneal level.

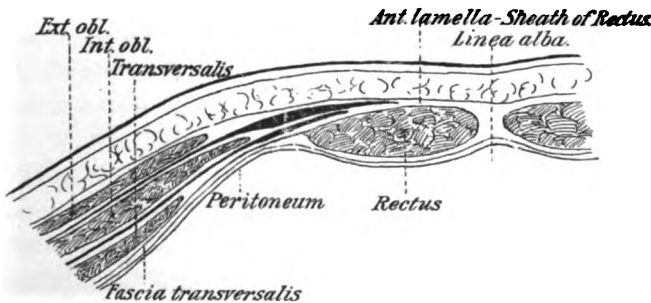
16. A continuous catgut suture is carried right across the pelvis from one ovarian ligature to the other, carefully doubling in any raw edge, such as the ends of the tubes, etc., and bringing together the anterior and posterior peritoneal flaps, so leaving a perfectly smooth pelvic surface.

17. The abdomen is closed without drainage by tier suture ; the peritoneum, by a continuous catgut suture. This must be carefully applied, so as to leave no gaps. The rectus muscle is ignored, but the fascia over it is very carefully united by interrupted sutures of *erin de Florence*. The subcutaneous fat is ignored. The skin is united by interrupted sutures of horsehair. As each layer is being finished, and before it is absolutely closed, firm pressure is made over it from the part finished towards the opening, pressing out all air, fluids, etc., the pressure being kept up until the last suture in that layer hermetically closes it. If this is done, no dead spaces will be left between the respective layers, which will be forced together by atmospheric pressure. When the last layer, the skin, is closed and dried, it should be painted with celloidin, which then forms an air-tight covering. I shall revert to this later. No drainage of the peritoneal cavity is permissible. This must be perfectly restored to its normal condition—that of an absolutely closed sac. If the accompanying figure, which is taken from Brauné, is studied (Fig. 39), it will be seen that the one essential barrier against post-operative hernia is the tendinous aponeurosis ; the common tendon, in fact, of the two oblique muscles and the transversalis. Above the fold of Douglas this tendinous expansion splits to enclose the rectus muscle ; below that fold, it passes entirely in front of that muscle ; but in either case it unites with that of the opposite side to form a firm inextensible shield supporting and protecting the abdominal contents. I wish to insist on the fact that its being the sheath of the rectus is only an incident, and, for our present purpose, a totally unimportant one. By its muscular origins on either side, when intact, it is drawn upwards and backwards towards the spine ; when divided, each half is at once drawn by the same muscular contraction towards its own side and away from the centre. No

other structure in the abdominal wall is so directly acted upon. No other structure has a tenth part of its supporting power. The rectus fibres themselves have no resisting material between them capable of counteracting internal pressure. The rectus fibres are only strong in a vertical direction ; they have no transverse resist-



Above the fold of Douglas.



Below the fold of Douglas.

FIG. 39.—TRANSVERSE SECTION OF ANTERIOR ABDOMINAL WALL (BRAUNÉ), SHOWING ARRANGEMENT AND ATTACHMENTS OF THE TENDINOUS APONEUROSES, COMMONLY CALLED THE RECTUS OR DEEP FASCIA.

ing force, but the individual fibres can be most easily pushed apart and separated. It is useless to suture them. Peritoneum and subperitoneal and subcutaneous fat are all equally yielding. The one structure which must be absolutely and completely restored to its original integrity is the fascia, this tendinous aponeurosis.

Sutures which embrace the whole wall, sutures even, which embrace this and any other structure whatever, will cut through that other structure, and so become loose, and unable firmly to approximate this, so as to resist, until firm union has taken place, the constant lateral pull of the muscles whose tendon it is. These sutures cut through not because they are too tight, but because of the persistent pull upon them. Therefore tier suture is imperative in order to obtain a safe and permanent result. The other structures are brought together for utterly different reasons: the peritoneum, in order as quickly as possible to reproduce the absolutely closed coelom, and to prevent the entrance into that cavity of any fluids from the wound; the skin, for æsthetic and aseptic purposes; this structure alone to provide against post-operative hernia.

Cullingworth¹ writes: "My method is to introduce through-and-through sutures of silkworm-gut, including all the layers. Before any of these are tied I introduce a buried, continuous suture of catgut to bring together the edges of the anterior sheath of the rectus. The effect of this is (1) to ensure that where the through-and-through sutures are tied the edges of the aponeurosis (the really strong and important constituent of the abdominal wall) will be in apposition, and will therefore have a chance of uniting; (2) to ensure indirectly, and without stopping to suture in tiers, that the layers above and beneath the aponeurosis will also come into apposition; and (3) to do this without leaving mischievous interspaces between the various layers, as the suturing in tiers is apt to do. I began this method on December 30, 1893, and have adopted it ever since, except in those very few cases of abdominal section where I have thought it necessary to drain. This method has answered its purpose admirably. I hardly ever have a hernia now. Before I adopted this method patients were continually coming back with a small or large ventral hernia."

Kelly² says: "Hernia was far more frequent in the days when the abdomen was habitually drained after all operations." It "is also due to failure in bringing the fasciæ into accurate apposition

¹ Private letter.

² Operative Gynæcology, Vol. 2, p. 522.

by good suturing. . . . With the knowledge that the strength of the lower abdominal wall lies in the fascia in front of the recti muscles have come more accurate methods of suturing this layer, and correspondingly fewer herniæ."

Professor Baldy¹ says: "I have carefully and conscientiously for the past few years followed up my patients wherever and whenever possible, in order to determine whether or not they develop hernia. I know of several such accidents, but in each and every case they are in patients on whom the old through-and-through suture alone was used. I know of none, and have the notes of none, which have occurred since I have been using my present method of closure of the abdominal wound. Many of these seventy-three patients are to-day within easy reach, and many more of them have been seen or heard from within the past year; in not a single one of them is there a hernia at the seat of the incision."

The combined operation is the favorite one of the present writer for the following reasons:

First, it is, I conceive, an advantage to have the abdominal cavity open above for as short a time as possible. The great freedom of vaginal hysterectomy from shock and collapse, as compared with that found in abdominal hysterectomy, suggests this. Such shock appears mainly to be due to the exposure of the intestine, and although this is not great in the Trendelenburg position, still there is some, and it is well to minimise it as much as possible. By separating the bladder for some distance, opening Douglas' pouch, and tying the uterine arteries beforehand, much less is left to be done from above, and therefore the time expended when that stage is reached is greatly diminished.

Secondly, the steps detailed are usually easily carried out from the vagina, but are often the most difficult of all from the abdominal side; especially when the pelvis is filled by a large tumor.

Thirdly, when once the uterine arteries are tied, the rest of the operation is almost bloodless.

¹ Amer. Journ. Obst., Vol. 39, No. 5, 1899.

Fourthly, when done from above, these steps have to be done at the end of the operation, when the fingers are tired, and have lost their earlier alertness ; are becoming numbed and do not recognise the parts so keenly.

Fifthly, the principle of previous vaginal freeing can be adapted to Kelly's operation, and greatly facilitates its performance.

With reference to the **question of drainage of the peritoneal cavity :**

When the operation is carried out as above described, and the peritoneal sac closed, there remain no raw surfaces inside the cavity. What is there to drain ? Blood ? But all bleeding points are outside, and, before closure, all evident blood or clot should have been removed. Serous oozing ? Where is this to come from ? And, even supposing any to be present, or likely to occur, the peritoneum, as Clark ¹ has proved, is far more able to deal with it, if unhampered, than we can by any method known. What, then, is the object of allowing, as Martin does, the vaginal gauze to penetrate into the cavity ?

But things are otherwise with the raw surface of the broad ligaments, and the ends of the Fallopian tubes, which now are, with the former, shut out from the peritoneal cavity.

Here there is no peritoneum with its wonderful powers of absorption to carry off and render harmless any micro-organism which may have found an entrance. This, therefore, so far as we can see at present, is better drained, but it must drain outwards, not into the peritoneum. So best can we avoid any peritonitis, or collections of dead fluid without. The peritoneum is, therefore, closed at once over these raw surfaces, and in twenty-four hours is organically sealed, whilst any fluids effused below find a ready exit by way of the vagina.

Anyone who has had to apply gauze a second time knows how painful a process it is ; and although some surgeons boast of having left vaginal gauze *in situ* for eight or ten days, I have always found that it becomes offensive in three or four. Only once

¹ Am. Journ. Obst., N. Y., April, 1897.

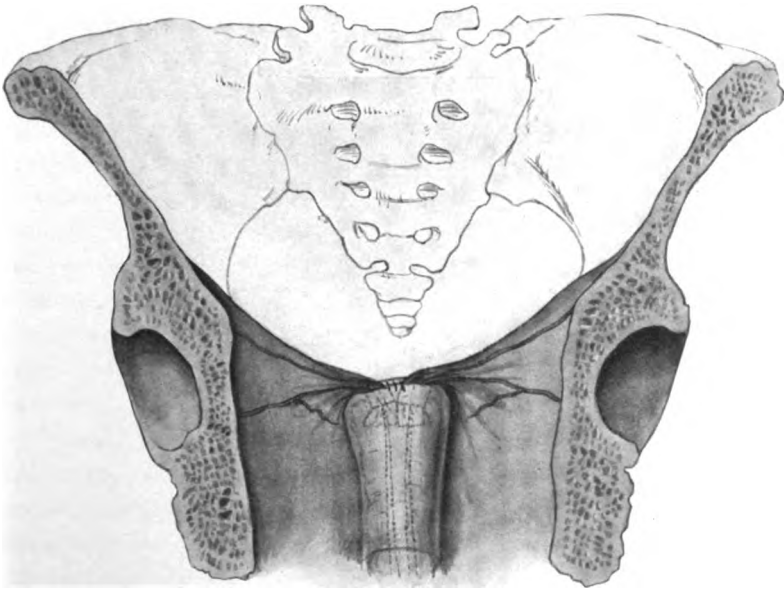


FIG. 40.—ABDOMINAL HYSTERECTOMY. (FOURTH STAGE.)

The pelvic peritoneum is united by fine continuous suture over the vaginal opening, so closing the peritoneal cavity in this direction. Whilst this is being done, the long ligatures may be one by one cut short, and withdrawn through the vagina, or they may be left to come away later, as they become loose. The vagina is loosely packed with gauze.

have I succeeded in leaving it six days. If it becomes offensive, other symptoms arise. There is sacral pain, there is rise of temperature at night, the appetite does not improve, and, often, there is difficulty and spasm in urination. If the gauze has penetrated the peritoneum, this can only close after its withdrawal, although a diaphragm of lymph may be thrown out over it. This, however, can not be implicitly relied upon, and removal of the first plug usually means replacement by fresh. If the peritoneum has been closed in the first instance, when the first plug is removed, there is no necessity for replacement. The parts can be kept clean by irrigation, which is absolutely safe after the first forty-eight hours, since no fluid injected can possibly find its way into the cavity. This is by no means so certain when the first plug has entered the peritoneum. The difference in comfort to the patient between irrigation and replugging is immense, and must be at once evident to anyone who will compare the two.

Sufficient cases also are on record of the danger of leaving the intestines exposed to contact with the raw edges of the broad ligaments to emphasize the necessity of reunion of the peritoneal flaps. (See Chap. VII, p. 145.)

Tournay, of Brussels, prefers the method of combined operation, commencing from below ; because, whilst it allows the operator, if necessary, to go no further than the ligature of the uterine arteries, it also enables him to finish from below or above, as seems best and most practicable at the time. My own cases before 1896 show a mortality of 25 per cent. Since abandonment of abdominal drainage, use of combined method, and celloidin dressing, just under 6 per cent.

Section 2. — Commencing from above. — Bouilly's ¹ method.

Technique.—Trendelenburg position.

1. Abdominal section. Opening proportionate to tumor.
2. Delivery of tumor.

¹ Discuss. at Soc. de Chir., Paris, April, 1898.

3. Double ligature of tubes and round ligament. Division between.

4. Anterior division of peritoneum above bladder and stripping downwards of that viscus.

5. Ligature of broad ligament, so as to include uterine arteries.

6. Amputation of cervix or removal of uterus above infected mass. Closure of abdomen.

Lithotomy position.

7. Removal of cervix or portion of uterus containing infected mass *per vaginam*.

8. Suture of peritoneal flaps from below.

9. Plugging of vagina by gauze.

The condition in which this operation is most likely to be useful is that of a sloughing fibrous tumor which has already opened up a communication with the vagina. I believe, however, that even here, if the procedure is practicable, it is better to thoroughly disinfect the vagina and cervix, then to plug and close the latter absolutely by suture, and, after a fresh disinfection, to proceed as in the last class—separating the bladder and vaginal attachments from below and removing the entire uterus from above. In carrying out the later steps it is important to avoid seizing and elevating the uterus by any forceps or screw which may tear its softened walls, and so permit of the escape of any putrescent material into the peritoneal cavity. The surgeon must also exercise unusual care in sterilising his hands after finishing the vaginal section of his work. In some cases such safe closure of the uterus may be impossible, and then this last operation should be employed. Pure vaginal hysterectomy with morcellation is very difficult in such cases, as the tissues are rotten, and it is difficult to obtain a secure grip of them.

Jacobs, of Brussels, following Skene, of Brooklyn, has advocated the use of angiotripsis, combined with the action of the electric current, for the prevention of hæmorrhage, and in order to avoid the use of foreign bodies as ligatures. The forceps he uses are very like ordinary forcipressure forceps, except that to one blade is attached a properly insulated wire, which can be connected with a battery (Fig. 41). By the use of this, the blades of the forceps

are raised to a temperature of 80° to 90° F., and convert the tissues on which they are placed into a horny, semi-translucent material, in which no trace of its original structure can be discovered, even with a microscope. A rheostat is introduced between the forceps and the battery, so as to regulate the effect of the current. The forceps remain in position from a minute to two minutes according to the size of the vessel acted upon. These forceps may be used to assist in the separation of adhesions, the

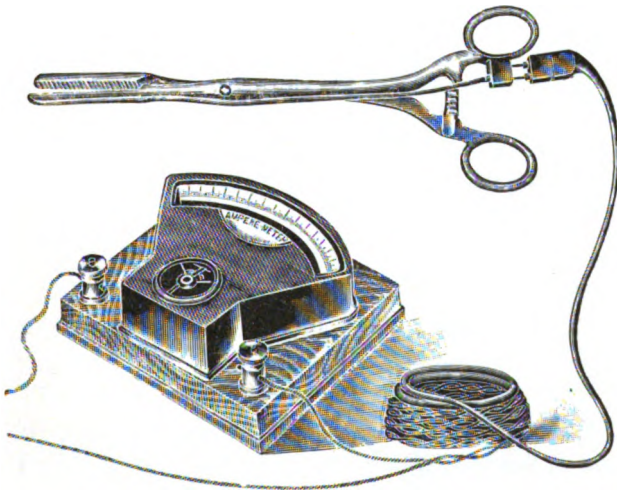


FIG. 41.—JACOB'S ELECTRIC FORCIPRESSURE FORCEPS.

division of an adherent appendix, the division of a pedunculated tumor or of the broad ligaments. The same principle is an old one, having been carried out in Baker Brown's clamp for ovariectomy, but the method is a much neater and cleaner one. Jacobs had 6 abdominal hysterectomies and 2 ovariectomies; Skene, over 200 abdominal operations of different kinds, all without secondary hæmorrhage. The avoidance of ligatures has always appeared to be a great desideratum, if it could be safely attained.

CHAPTER XI.

POST-OPERATIVE TREATMENT.

The after-treatment of these cases varies somewhat according to the method employed. But there are certain details which are required in all.

During any operation which necessitates exposure of the peritoneal cavity, the bodily temperature is lowered. This is combatted during the work by the use of external heat, by warming the table itself, by fully surrounding the patient's body and limbs with hot blankets, cotton-wool, etc., by the use of the Trendelenburg position, by the use of hot saline solution for sponges, instruments, etc., by the temperature of the room itself in which the operation is performed, the exclusion of draughts, etc., by the use of hot nutrient enemata containing brandy, on the table, if required. The same care to guard from exposure to cold and to conserve the patient's own bodily heat must be taken during her transference from the table to bed, and afterwards. At the conclusion, the action of the heart is often somewhat feeble, and I have found this danger best met by a hypodermic injection of liq. strychniæ, from ten to twenty-five minims, according to the condition of the pulse.

On return to bed, the patient is to be wrapped in warm blankets, the head is wrapped in hot woollen, hot bottles are placed wherever required, and the foot of the bed is raised at least six inches from the floor, often much more. This is done for two reasons: First, to favor the supply of blood to the vital nerve centres in the brain; and, secondly, because Muscatello has shown that deleterious material is carried off from the peritoneum mainly by the leucocytes in the intercellular spaces of the diaphragm, and that the action of gravity favors this. He experimented with dogs:

into their peritoneal cavity carmine was introduced ; particles of this were found in the retrosternal lymph glands five and a half hours afterwards if the dog were supine ; but if placed head downwards, within five to seven minutes. Another reason is brought forward by Lennander,¹ who noticed thrombosis of the crural veins in five cases following abdominal section. He considers that this practice lessens greatly the risk of this complication. The bed is lowered to the normal on the fourth or fifth day.

The essential dangers after abdominal section are three : (1) Consecutive or secondary hæmorrhage ; (2) peritonitis ; (3) septicæmia. Shock and collapse are at present believed to be due to one or other of these. My own experience would entirely confirm this. There is always some enfeeblement of the whole system after an abdominal operation, which appears to bear a direct ratio to the previous condition of the patient, the amount of blood lost, the time during which the abdominal cavity is exposed, the amount of manipulation of the intestine, and the presence or absence of direct contact of contagious material with the peritoneum or the wound. Reaction from this condition also bears a similar relation to these factors. The latter is therefore best secured by scrupulous care during the operation itself ; care to obtain accurate and permanent hæmostasis, so that a slipped ligature becomes an impossibility ; care to avoid contact with the contents of a pyogenic cavity ; care to reproduce a perfectly closed and absolutely smooth peritoneum, in order that no raw surfaces are left to which internal viscera may adhere. So that, contrary to some teaching, shock is not avoided by rapidity of operative work, but rather by the reverse. This is, of course, true only up to a certain point. Rapidity is important, but only as secondary to careful and complete work.

It is not necessary, if celloidin has been applied after abdominal cœliotomy, or, in vaginal cases, if the pelvic peritoneum has been closed, to keep the patient rigidly on her back. Such a confined position rapidly becomes intolerable, whilst the restraint worries

¹ Centralb. für Chirurgie, 1899, No. 19.

and annoys the patient, and thereby decreases her chances of recovery. Christopher Martin¹ also considers this restriction "cruel and needless." He permits his patients, as I do mine, to lie in any attitude which is most comfortable, allowing the nurse to turn them from time to time. It is perhaps unnecessary to point out that this freedom is only made possible, first, by the abandonment of the drainage-tube; second, by absolute security as to internal ligaturing of vessels; third, by certainty as to accurate suturing of the aponeurosis; and, fourth, by reproduction of the *smooth closed* peritoneal sac. The celloidin dressing, I think, adds to this possibility of freedom, though I believe Christopher Martin does not use it.

The use of celloidin as a permanent dressing after abdominal section deserves perhaps rather more consideration. In my own practice it has completely displaced all other methods of treatment of the external abdominal wound. Its advantages are many. During the whole process of healing the progress of the wound can be watched without disturbing the patient further than to turn down the bedclothes. There are no bandages to ruck up beneath her body or to irritate the skin. There are no dressings to change. There is no fear of dust or dirt of any kind; in fact, dust might lie thick all over the celloidin, it cannot possibly find its way in—a matter of considerable importance if the patient herself is of dirty habits, or has to be left in the charge of a careless, dirty, or incompetent nurse. There is very much less need for keeping the patient in one position, which so soon becomes irksome to her. One of the reasons for doing this was that constant movement tended to disturb the dressings upon which we relied for keeping the wound aseptic. Once the celloidin is dry, the patient cannot shift it. However she may move, she carries her dressing with her, always in accurate apposition. At the end of from ten to twenty days—the time differs very much with different skins—the dressing peels off of itself, leaving the skin wound healed beneath it. If advantage is taken of this to snip through the skin sutures at their

¹ Trans. Brit. Gyn. Soc., 1898, Vol. 14, p. 360.

exit on one side, just when the dressing is almost loose, sutures and dressing will all come away at once with no pain or discomfort.

The material used is a solution of celloidin in alcohol and æther, with the following formula :

Celloidin,	1 part.
Abs. alcohol,	} 4 parts.
Æth. sulph.,	

It is a clear fluid, which requires to be kept in a cool place, and in a well-stoppered bottle. It is applied with a brush to the absolutely dry surface it is intended to cover. In order to obtain such dryness, it is well to wash the part quickly with æther. It sets in about thirty seconds and forms a firm, air-tight connection with the underlying skin, becoming at once slightly puckered at the edges; if all goes well, it even causes the part to which it is applied to sink perceptibly below the level of its surroundings. The stitches, with their points of entrance and exit, and the line of union, can all be plainly seen through the glass-like film which is formed over them.

But for success in the use of this method, three things are essential : First, the original wound must be aseptic—not merely supposed to be so. Second, it must be dry. There must be no oozing of blood left, under the idea that it is harmless and will stop of itself. Third, all air must be carefully pressed out, so that external atmospheric pressure may obliterate any dead spaces in the tissues beneath.

If these conditions cannot be obtained, it is far safer to dress with the ordinary dressings. In one of the earlier cases in which I employed this method my patient died of septicæmia. No cause was apparent : the wound looked healthy through the celloidin, there was no peritonitis, the temperature went up, the complexion became muddy, the expression stupid, and death ensued. At the post mortem, the peritoneal cavity was found perfectly healthy, but beneath the skin, and between it and the muscular layer, was a large accumulation of decomposing, stinking, grumous blood.

The contraction which always is produced by the setting of the celloidin had prevented any bulging outwards, which would have attracted attention, or any great amount of redness around the wound. Now, after this experience, the faint blush present, and the fact that the skin around the celloidin plate was flattened, not finely puckered, as it is normally, with the raised temperature, would be sufficient proof of the presence of pus, or at least of decomposing fluid. Acting upon this, I gave exit to several ounces of grumous pus and shreds from an abdominal wound in another case, in which no more local signs existed. In this case a chromicised catgut suture appeared to have been the starting-point of the accumulation, but also very evidently all oozing had not been effectually stopped before closure. There is a great temptation, if vessels in the wall have been closed by forcipressure, and the forceps being removed, no immediate bleeding is noticed, to trust to this. I am convinced that this is unsafe if we wish to use celloidin. All points must be securely tied. But if the three essential stipulations mentioned above are complied with, after four years' trial of the method I am able to say that no other method has given me as good results in rapidity, security, and safety. Moreover, the final appearance of the scar, a matter of some moment, is all that could be wished. It is almost always a faint white line.

These photographs show very well the progress of wounds after sealing by celloidin.

Figure 42 shows a coeliotomy after forty-eight hours. The sutures and the puckering normally present can be seen through the transparent dressing. This puckering of the skin is not due to the presence of tension sutures, but simply to the contractility of the material employed.

Figure 43 shows a similar case seventeen days after operation. The sutures are still in position.

Figure 44 shows figure 42 after three weeks; celloidin and sutures removed. The area is slightly stained. On the patient's left are the marks of plaster strips which held a blister in place.

In some cases it may not, however, be possible to secure these

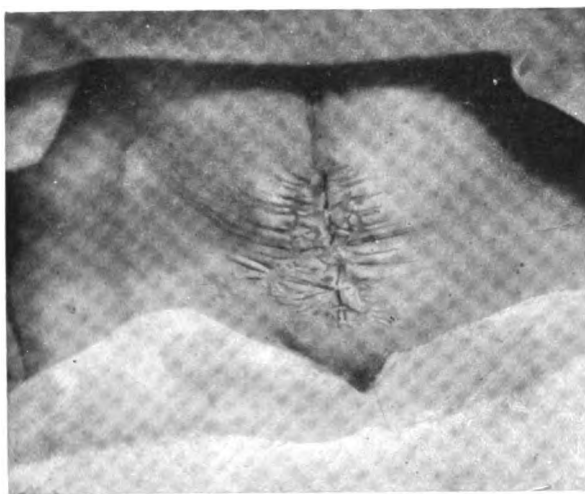


FIG. 42.—FORTY-EIGHT HOURS AFTER OPERATION.



FIG. 43.—SEVENTEEN DAYS AFTER OPERATION.



FIG. 44.—THREE WEEKS AFTER OPERATION.



FIG. 45.—TWO AND ONE-HALF MONTHS AFTER OPERATION.

three essentials. In such, it is better to cover the line of incision with iodoform gauze, superposing layers of wood-wool or absorbent cotton, which then should fill in all hollows, such as those in the inguinal region, and should extend round the body, filling up the lateral lumbar curves ; all being kept in place by a flannel many-tailed bandage. The object of this bandage is simply to keep dressings in place ; it is not to support the abdominal viscera, or to keep the edges of the wound together. Those ends are only to be obtained by careful suturing, especially of the aponeurosis. If

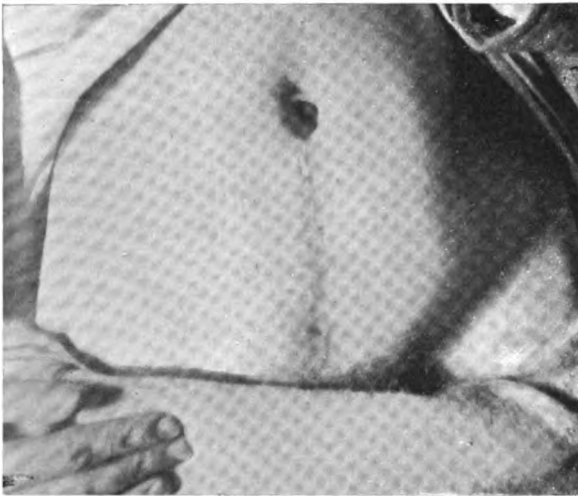


FIG. 46.—EIGHT MONTHS AFTER OPERATION.

this has not been done, no amount of bandaging will neutralize the natural contraction of the oblique and transversales muscles, and the consequent gaping or deeper yielding of the wound.

Much difference of opinion exists as to the necessity for **deprivation of fluids** during the first twenty-four or forty-eight hours after operation. Everyone will agree that this is one of the most unpleasant experiences of the patient. Any interference with the peritoneum appears to excite thirst, and to forbid fluids by the

mouth under these circumstances looks like cruelty. Unless the risks of permitting the patient to drink freely are really great, no one would think of refusing to allow her to quench her sometimes intense thirst. But, I confess, it seems to me well worth her while to put up with this temporary discomfort. The main risks during the first two days are secondary hæmorrhage and the development of micro-organisms within the peritoneum. Post-anæsthetic vomiting is likely enough to occur, and nothing, in my experience, checks vomiting so much or so quickly as absolute rest of the stomach. More than once or twice I have yielded to the urgent desire of the patient for fluid, only to have it vomited again in a few moments. Movements in bed are nothing to the effect of the jerking diaphragmatic action of emesis in the risk of loosening some ligature and bringing on internal hæmorrhage. Then the chances of development of organisms depend upon the rapidity or otherwise of their removal, absorption by the lymphatics, and phagocytosis. If the currents set up are rapid, these organisms will be disposed of before they have any chance of reproduction or development. If not, in twenty-four hours they will have so multiplied that, even if absorbed at the end of that time, they may overpower the defending leucocytes, and the foundation of septicæmia be laid. Surely it is but reasonable to suppose that if the general system is crying out for fluid, absorption into the vessels from all available points, and, amongst the rest, from the peritoneal cavity, will be more rapid and thorough than if its wants are supplied from an extraneous source. The deprivation is only for a short time, and it is far kinder to enforce it as long as it is important for her than, by yielding to the patient's immediate desire, to bring upon her the dangers and miseries of a septic peritonitis or an internal hæmorrhage. For these two reasons, therefore, I insist on abstinence for twenty-four hours; and if sickness has not entirely passed off by that time, fluids are only tentatively given, and in very small quantities for the next twenty-four. Washing out the mouth and back of the throat is, however, permitted and encouraged.

If chloroform sickness is persistent, I have found the best re-

sults follow sips of *hot* tea, mustard to the epigastrium, and three-minim doses of a 10 per cent. solution of cocain, repeated every half hour. Ice is poisonous. It should never be used.

For the same reasons an endeavour should be made to obtain peristaltic action as soon as possible. Within twelve hours three grains of calomel, combined with an equal quantity of Dover's powder, are given, with just enough hot tea to wash it down, and this is repeated in one or two hours, as may be necessary. If there has been no complicating tubo-ovarian abscess, one or two doses with an interval of two hours may be all that is required; but if there is any suspicion of soiling of the peritoneum by discharges of this kind, I do not hesitate to give three doses, one every hour. Calomel is preferred, since it is at once a purgative and an intestinal antiseptic. A rectal tube is introduced from time to time for half an hour, since flatus may collect in the lower intestine, and in the weakened condition of the patient this viscus may not have sufficient force to enable it to overcome the contraction of the sphincter. Should gas accumulate sufficiently to distend the gut, with each succeeding hour the power of the latter will decrease, and paresis ensue, which will extend further and further upwards. If two or three doses of calomel do not produce the desired result, an enema containing turpentine with soap and water is given, which is almost always successful.

There is an additional reason for obtaining early peristaltic action besides those mentioned above. Many instances are on record of adhesion of intestine which has been allowed to remain in contact for any length of time with some patch of parietal peritoneum which from any cause has become inflamed. Some plastic peritonitis is inevitable after section, in order to produce union of the divided layers. It is precisely such plastic peritonitis which is most dangerous from this point of view. The small intestine, unless in constant movement, will almost certainly adhere; and if compelled to move later, will draw out the yet soft adhesion into a band, which in after years may produce internal hernia or some other form of intestinal obstruction. If it remains long enough quiescent to become firmly adherent, the gut, says

Treves,¹ "at the adherent spot cannot exercise its peristaltic function. It becomes a more or less inert segment in an active tube. . . . When there is much angular bending of the gut, the contents of the bowel have to be not only forced through an inert tube, but have to take a devious course, and encounter several definite obstructions," and he refers to a case reported by Harrison Cripps,² in which acute obstruction set in eighteen days after the removal of a large fibroid growing beneath the broad ligament. So inseparable were the adhesions that the damage inflicted upon the bowel whilst freeing it necessitated the formation of an artificial anus.

Especially is this early movement necessary, it would seem, in these cases, since the line of peritoneal union is not alone in the anterior wall, where, with the patient on her back, it is conceivable that the intestine might not lie so closely as to be in danger of adhesion, but there is also another line of union in the pelvis, and small intestine always gravitates there. This is beautifully shown in Kelly's *Operative Gynæcology* (Vol. 1, Figs. 22 and 23, taken from an emaciated patient). In these drawings the anterior parietal peritoneum lies upon the anterior wall of the mesentery, which thin membrane alone separates it from the posterior parietal layer of the peritoneum, the bulk of the intestines being contained in the flanks and in the pelvis, so that adhesions there would be almost certain to occur. I have already referred to cases in which this adhesion was produced.

Peritonitis itself is not a disease. It is an effort of nature at repair, or else a similar effort to localise septic material, and to shut it up in a situation in which it will do the least harm. The former is inevitable whenever the peritoneum has been wounded, and is to be welcomed. The latter is only of importance as showing the presence of the greater danger, and is best avoided by the elimination of the causes of that danger, both at the time of operation, by asepsis, and later by quick removal of germs before they have time to accumulate.

¹ *Intestinal Obstruction*, 1899, page 83.

² *Brit. Med. Journ.*, Lond., 1894, Vol. 2, p. 1103.

There are certain cases, however, in which, in spite of what has preceded, it becomes necessary to supply the system with fluid. Such cases are those in which there has been great loss of blood at the time of operation, or previously to such an extent as to deprive the heart of a sufficient amount to permit of its regular and equable contraction. In these cases the action of the heart is extremely rapid and feeble. Many cases, however, have been due to insufficiently careful hæmostasis; a slipped ligature, by permitting hæmorrhage into the abdominal cavity or, beneath the peritoneum, into the loose connective tissue, will produce this condition. Vessels which did not bleed to any extent during the operation will leak when, the immediate shock over, the force of the heart's action regains its normal power. But as increased care is exercised in this direction, the number of such cases will diminish. It will, however, always be possible in certain patients. The necessary fluid must be supplied, not through the mouth, as this might produce vomiting, and absorption from the stomach and intestines is comparatively slow. The fluid must be normal saline solution, and one to two pints of this may, if there is no very great haste required, be injected into the rectum. Absorption from this viscus is slow, but it has the advantage of not producing vomiting. Should haste, however, be necessary, the fluid must be introduced more rapidly, by transfusion. Transfusion into a vein is, no doubt, the most direct method; but there are certain objections to this proceeding. First, a special cannula is required, which may not be at hand; next, the veins are almost empty, collapsed, and consequently sometimes very difficult to find; then more time is consumed in isolating, opening the vein, and tying in the cannula. Should a little air enter, grave mischief will result; so that injection into the subcutaneous cellular tissue, which can be immediately done, is, in the end, both the quickest and the safest way. The most convenient spot, I believe, is beneath each breast; the fluid enters easily, requiring no more force than can be obtained by raising the funnel two or three feet above the patient, and the prominence of the breast is a good test as to the amount to be used at any one time. It should feel firm and hard.

Fluid from this situation is readily absorbed. I have seen one breast, which immediately after injection was quite tense, almost at its normal level again before the other was fully distended. The only apparatus required is a strong pen-pointed hollow needle, with three feet of rubber tubing, and a glass funnel. All should be previously boiled or steamed in a steriliser. The skin through which the needle passes must be scrubbed with turpentine upon a small cotton pledget; this washed off with an alcoholic solution of mercuric biniodide, 1 : 500, and lastly with sterile salt solution. The saline solution used for transfusion must be sterile and of the temperature of the body, 98°–99°.

The use of morphia at all after what has preceded would seem to be excluded, since it decreases peristaltic movement; but this is just one of those cases in which rigid theory does not precisely coincide with practice. Many patients complain greatly of pain when the effect of the anæsthetic has passed. Many more are extremely restless. Nothing calms this restlessness so well as a quarter to half a grain of morphia administered hypodermically or in a suppository. Restlessness and pain are to be avoided if possible, since they introduce fresh risks of exhaustion and possible internal hæmorrhage. It is sometimes of more importance to relieve such symptoms than even to run the risk of checking peristaltic action. If the other measures mentioned above are carried out, I do not think this danger amounts to much, but each case must be judged of at the time. The surgeon himself must decide. If the pain or restlessness is slight, it will usually soon subside. If great, I have always used morphia to the small extent mentioned, and have never seen reason to regret having done so. Belladonna is sometimes an efficient substitute.

I believe that the use of a catheter is very seldom indeed required. It is surprising sometimes how long a patient may remain without urination, and yet, at last, urinate without difficulty. If she can be induced to do so naturally, a great deal is gained. If a catheter is once used, it has generally to be used again two or three or more times, and however careful the nurse may be,—my own always use glass catheters, which are boiled before use, and

dipped in glycerine,—the mechanical irritation due to its passage is usually sufficient to determine more or less cystitis, which is very obstinate. If the patient once passes urine naturally, she will almost always continue to do so. In cases of difficulty, a change of position, warm moist sponges to the vulva, etc., will usually overcome it, and it is better in any case to wait than to use the catheter in a hurry.

The diet should at first consist of hot tea—tea so hot that the patient can only sip it. There is nothing gained by denying milk and sugar. These should be added to the patient's liking. If this is retained, it is followed by hot beef-tea, hot Benger's or Mellin's food, made at first with water, then with milk gradually increased. Very soon appetite returns, and as soon as the bowels have acted, I begin to give boiled fish and chicken, milk puddings, eggs beaten up with milk and a teaspoonful of brandy. I have never found champagne of the least good, but have seen it produce sickness after this has ceased. Increase in the dietary will now depend upon the progress the case is making, her appetite and capacity for food.

Most operators advise the use of a belt when the patient begins to go about. This appears to me to be due to a lingering doubt as to the efficiency of the means used for uniting the breach in the abdominal wall. I have already said so much as to the real security upon which we have to depend against the occurrence of ventral hernia that it is needless to recapitulate. If the aponeurosis is firmly united by sutures which are well applied, and have no other tissues in their grip, through which they may cut, and so become loose, we have only to wait until union is firm before putting any strain upon it, to have the best and only true belt possible. Belts outside the skin have no power to prevent herniæ. For this reason I prefer that no patient who has undergone abdominal section should sit or stand for six weeks—the time which experience in the treatment of hernia has taught us is required for the union of fibrous tissues. She may be lifted on to a couch long before, but the time so expended is well laid out in securing permanency in results for the remainder of her life. I have no

interest in being able to say that my patient sat up in a fortnight, and went home in three weeks. On the contrary, I think it is decidedly reckless to allow her to do so, for the reasons I have given. Permanency in results should rank before rapidity in obtaining them.

Vaginal gauze may be removed, if the pelvic peritonem has been carefully closed, at any time after forty-eight hours. In many cases it is an advantage to do this. The gauze plug may press upon the bladder, and so impede the passage of urine; or on the rectum, and check the escape of flatus. It may sink down towards the vulva, and so annoy the patient; or it may become offensive. The peritoneum will by that time be absolutely closed, and, therefore, there is no objection to irrigation of the gauze, if it should stick at all. Moist gauze usually comes away with less effort than if dry, and force must on no account be employed. Afterwards, daily, or more often, if necessary, the parts at the top of the vagina should be irrigated with warm antiseptic fluids—boracic acid solution is usually preferable. Ligatures, if cut short, usually give no trouble; if long, they will generally come away of themselves during the third or fourth week. Occasionally, they are very obstinate and irritating, and therefore I prefer to have them cut short at the time of application.

CHAPTER XII.

FINAL RESULTS.

The immediate result of the operations, so far at least as their mortality is concerned, has been dealt with already in connection with each variety of procedure; but such returns are, although of very great importance, hardly of as much interest, either to patient or surgeon, as the records of final results—the condition in which the person operated on may be expected to pass the remainder of her life.

Numerous questions naturally occur to both the surgeon who recommends, and the patient who is about to undergo, any one of the operations above considered. When reassured as to the prospect of immediate danger, the consideration of after-effects becomes more and more important; and especially is this the case if the sufferer is in the fittest condition for their performance, and has therefore not as yet been subjected to the worst effects, intense pain, utter disability, or extreme anæmia, consequent upon the disease for which she seeks advice. Such questions as the following are likely to present themselves:

1. If an operation is performed, will the general health be better or worse than before?

2. Is immediate benefit to be expected, or will the improvement be gradual?

3. After the operation, is there likely to be a continuance, recurrence, or development of:

- (a) Pain,
- (b) Vaginal discharges,
- (c) Bleeding,
- (d) Prolapse or hernia,
- (e) Mental troubles,

(f) Difficulties or abnormalities in defæcation or urination,

(g) Fæcal fistula or persistent sinus?

One of the great advantages claimed for removal of the appendages and myomectomy was that the uterus was retained. Has this proved to be any advantage, mentally or physically?

In twelve months' time from the operation, which set of patients are in the better condition—those who have had the uterus and tumor, with perhaps one ovary, removed, or those who still retain the uterus, but have lost their appendages?

In those operations in which the uterus is removed, what is the condition of a patient who has had a supra-vaginal amputation with extraperitoneal fixation in twelve months' time, as compared with that of one who has had a subperitoneal or a pan-hysterectomy?

In pan-hysterectomies, what discomforts might be expected, and do they present themselves?

A firm organ has been removed, which normally lies between the rectum and bladder, and is to some extent attached to both. Both these organs previously have functionated with some reference to this organ; will their power be interfered with to any appreciable extent now that has gone? In other words, will there be dysuria, undue frequency, loss of contractile expulsive power of the bladder through loss of what has been a *point d'appui* for its fibres, undue constipation, diarrhœa, kinking of rectum, or obstruction at either of the rectal valves?

Certain authors have described the cervix as the keystone of the pelvic diaphragm, or arch, of which the broad ligaments form the wings, and consider that it supports to a great extent the abdominal contents, the small intestine. If this is removed, will the arch fall in? Will there be vaginal prolapse?

Our patients are often brought to the last stage of anæmia by prolonged and repeated loss of blood. When the source of this bleeding is taken away, can we rely upon its cessation? If the ovaries and tubes are left behind, as each menstrual period comes round will there not be a local congestion of these organs, and shall we not have some bleeding, as before, if only a normal men-

strual loss? and, if not, will vicarious menstruation occur, or epilepsy, or even, in older and normally plethoric women, apoplexy? Supposing no more blood is lost, may we expect that the lost circulating fluid will be made up? or will our patient always remain exsanguinated and anæmic?

These are perhaps the main questions which require an answer in relation to operations for fibromyomata, and some of them cannot be said to be completely answered yet.

The answers to them are very difficult to obtain. Any reliable conclusion must be founded upon the combined experience of a large number. In order to obtain this, application has been made to many of the best-known operators—and then a fresh difficulty presented itself. Mr. Rutherford Morison, of Newcastle, writes: “Living, as I do, in the middle of a pit country, it is impossible to trace infirmity patients. Pitmen move about like gypsies from one colliery to another, and often take their wives—they seldom remain in one place”; and I believe that this is to a large extent the general experience with regard to hospital patients, who must always form the main bulk from which statistics might be obtained, so that it is found that a great number cannot be traced—those especially from whom we could learn most; those who have been operated upon for more than twelve months.

Statements obtained from operators alone are therefore almost necessarily bound to be impressionist; and their temperament naturally tends to make this impression a favorable one, more especially if they happen to have originated a particular method. It appeared probable that another source of information might be found amongst the medical superintendents of our numerous workhouse infirmaries or of hospitals for incurables, to which so many operative failures of the poorer class drift, and that, even if reports from these should prove to be unduly depressing, as was probable, the truth would probably lie somewhere between the two.

And, first, as to the operation for removal of the appendages.

Tait¹ himself reports 258 cases treated in this way with good

¹ Abdominal Surgery, p. 210.

final results ; but that these good results are not always to be looked for, or, if obtained at first, are not always permanent, is evident from the experiences of other surgeons. Gottschalk,¹ for instance, mentions a case in which, the appendages having been removed in 1892, hæmorrhage was checked for some months, then gradually returned, and at last continued for four weeks.

Two out of four women treated in this way in the Leipsic clinic for myomata died six and seven years after from regrowth of the tumors ; in one a myosarcoma developed.²

Dr. Donald³ writes that "in cases in which oophorectomy has been performed the patient has often suffered for periods of longer than one year from symptoms produced by the involution of the tumor." Mr. Christopher Martin⁴ writes : "I have removed the appendages for myoma in twenty-nine cases with three deaths. . . . Of the twenty-six who recovered, I know six have been failures ; that is, the operation failed to arrest the growth of the tumor or to stop hæmorrhage, etc. Five of these have since undergone the operation of hysterectomy. Of the remaining twenty, fourteen are known to be cured, whilst six have been lost sight of. I have now entirely abandoned this operation." In his paper on Conservative Surgery of the Ovary⁵ he mentions as results, amongst others, of this operation : "The uterus, and, to a less extent, the vagina and vulva, undergo a process of atrophy ; the nervous symptoms of the menopause appear abruptly and violently : viz., heats and flushes, perspirations, palpitations, giddiness, depression of spirits, and a general unstable condition of the nervous system." Mr. J. W. Taylor,⁶ of Birmingham, on the other hand, "still employs removal of the appendages for the treatment of many cases of myoma, reserving hysterectomy for the very worst cases."

Dr. Heywood Smith⁷ adduces two cases done about the menopause in which the tumors were quite absorbed, the uterus return-

¹ Ann. de Chir., Par., 1898, Case 9.

² Zweifel's Report, Berlin Congr., 1899.

³ Private letter.

⁵ Lancet, Lond., Aug. 27, 1898.

⁴ Private letter.

⁶ Private letter.

⁷ Private letter.

ing to its normal size ; but occasionally, he says, discomfort is felt as if from intestinal adhesions ; “ has seen two or three cases where there has been still some loss (catamenia ?), perhaps from incomplete removal ” ; and Mr. Rutherford Morison¹ writes : “ Three women are well known to me personally whose ovaries I removed twelve, nine, and three years ago for fibroid. They were all young women, about thirty. All had bad bleedings. None of these cases were exactly alike. No. 1 had a tumor as large as a six months’ uterus (up to umbilicus), and like it in shape, but harder, though not hard. No nodular growths in it. She was very ill when operated upon. Dropsical from anæmia. Though she has never recovered from the anæmia, her health is good. She has never had any hæmorrhage since the operation. She is active physically and mentally, and is fully occupied. She had a few flushings, ‘ but nothing to speak of,’ and has nothing to say but in praise of her operation. Her uterus is large and hard, but entirely in the pelvis.

“ No. 2 had a large multinodular tumor reaching above her umbilicus, which I now should not hesitate to remove. Her poor condition, and the ease with which the ovaries could be removed, tempted me to do this. She had had hæmorrhages during the first year,—three or four,—never profuse, but since then nothing. She also had flushes and was nervous during this time. Since then she has been as well as possible, and is now matron of a large establishment, which appointment requires considerable mental and physical vigour. She can feel no tumor, but I have not examined her.

“ No. 3, a young lady engaged to be married before operation. Profuse hæmorrhages. Tumor size of adult head found in pelvis, apparently involving the whole uterus and burrowing into both broad ligaments. Married six months after operation. Occasional odd small hæmorrhages. Health perfect. Husband and she both very pleased at result. I have not examined her, so cannot say as to tumor.

¹ Private letter.

"These are the only cases I know well enough to give definite information about. In three cases I have removed the fibroid uterus after failure of oophorectomy by other surgeons, and in each instance, so far as I could judge, the operation has been completely done. One had a small polypus, two had submucous fibroids."

Johnson believes the average failures of the operation amount to about 10 per cent.

Dr. P. G. Lewis,¹ of the St. Andrew's Home, Folkstone, writes :

"My conclusions are :

"1. Most patients, when pressed for an opinion, regret that they had their ovaries removed, because they say their powers of enjoyment of pleasure are almost obliterated, also that they are equally incapable of feeling sorrow. In fact, that they exist, but do not live.

"2. Patients are hardly ever cured when recovered from the operation. Months or years of ill health or great discomfort have to be put up with. Frequently abscesses form, even after two years from the operation. Secondary operations are frequent, for getting free drainage. I think they are hardly every really well.

"3. I have not come across any cases of myomectomy, or of hysterectomy without oophorectomy, and therefore conclude they are the most satisfactory operations." (?)

The general result of investigation appears to be adverse to this method. In certain cases, as in those tumors undergoing fibrocystic change, it fails altogether; in others it requires considerable time to develop its undoubtedly good effects—time which to an exsanguinated patient may mean loss of life, or to others, with a large tumor, many months of misery; whilst in still other cases primary improvement may be followed by regrowth, compelling resort once more to operation, at last of the radical character, which might have been carried out at first more easily and safely than is possible with a secondary operation. Almost all secondary operations are more difficult and complicated than primary ones, in consequence of alterations in position of structures,

¹ Private letter.

adhesions, etc. When hysterectomy had a prohibitive mortality, a proceeding of this kind, which had so small a primary risk, and which had at least some prospect of success, was naturally welcomed; but when once the mortality of the major operation had fallen, the need for this alternative disappeared. I have no personal experience of this operation; it has never recommended itself to me as a scientific procedure.

Of the final results of other operations which also act by decreasing the supply of blood I have been unable to obtain any definite reports. These operations have never apparently found favor in Great Britain or America, and I have already given all the information I possess respecting them.

With regard to myomectomy, from the abdominal side, I have not been able to obtain much information. Sutton and Giles¹ say: "The after-effects of abdominal myomectomy are admirable, as the surgeon is able to leave not merely the uterus, but the ovaries and tubes as well. In some instances the patients have become pregnant and had happy deliveries."

Howard Kelly² mentions two cases, amongst others, one in which "the entire anterior wall of the uterus was removed, leaving only the mucous surface of the posterior wall. A new uterus was constructed out of what remained, and the patient, who had before suffered intensely, and with profuse hæmorrhages, has since menstruated naturally." Another, "a young woman of about thirty years of age, had masses of myomatous nodules fixed in and choking her pelvis; the only normal part of the uterus which could be distinguished was the cervical end. I . . . extracted a number of large myomata, leaving a much incised, and a much sutured, but otherwise intact uterus. She made a perfect and rapid recovery, and I have since learned that she is engaged to be married." (Compare account of Alexander's method, Chap. IX.)

Heywood Smith³ writes that this operation "saves the uterus in some cases, but it is not always easy to be sure that there are

¹ *Diseases of Women*, 1897, p. 4151.

² *Conserv. Treatment of Myomatous Uteri*, Journ. Am. Med. Assoc., Oct., 1897.

³ Private letter.

not other fibrous nodules left in the uterine body, which may afterwards grow and develop." That this statement is true may be seen in figure 16, where three large fibroids which might have been enucleated were evidently present; but after removal of the uterus and division, several other small ones are to be seen, which were not recognisable by sight or touch previously, even after the uterus was out of the body. And Grieg Smith¹ says: "Theoretically this operation of abdominal enucleation is admissible, but practically the mortality is high. In the hands of Schroeder himself, its chief advocate, 18 operations were followed by 11 deaths, chiefly from hæmorrhage and peritonitis, and the results of other surgeons were just as bad. The great risk is that when the inevitable uterine contraction takes place, hæmorrhage may set in." I should myself think it more likely to be due to the alternating contraction and relaxation of the uterine muscular fibre, and most likely to occur during the period of relaxation. "The almost equally great danger of peritonitis would seem to be favored by the inclusion of discharges under pressure in the uterine wound. It may be taken as practically true that it is not safe to leave a wound through hypertrophied uterine tissue with no more perfect guard against hæmorrhage than a non-contractile ligature, which constricts uterine fibre as well as vessels, and even less safe to leave hæmorrhage to the mercy of mere compression by flaps sutured over the wound." These objections would seem to apply with equal force to the subperitoneal method, considered later; and should be considered in connection with Tait's description of a uterine cervix belonging to a fibroid uterus.

But the main objection from the point of view of final results is the almost complete certainty of fresh development of tumors unavoidably overlooked at the time of operation.

Vaginal myomectomy is liable to the same objection, but here the conformation of the uterine fibres is such that, if the tumor is removed from within, their contraction afterwards tends to arrest hæmorrhage, and to prevent lodgment of decomposable fluids. If

¹ Abdominal Surgery, Vol. 1, p. 322.

removed from without, as in vaginal myomectomy with colpotomy, anterior or posterior, this advantage is not obtained. It is obvious that in such a case as that of figure 2 vaginal myomectomy would have restored the uterus practically to a normal condition, at least for a time. But such an operation would, of course, not remove a pyosalpinx or ovarian abscess such as complicates this and so many of these cases; and would, therefore, still leave a source of grave danger behind. Moreover, if once a tendency to the formation exists, it would be impossible to predict immunity for the future.

In 1896-97 I operated in this way from within upon three patients, neither of whom have as yet returned with any relapse. In reply to a circular letter sent to all my fibroid patients, one replies, Case M. F., February 1, 1900—*i. e.*, four years later: "I am very pleased to say I have been very much better in health since the operation. I have been rather a long time in getting my strength back, but the last nine months I have been better every way. I have a little pain sometimes with the courses, but that is very much better also; a little discharge occasionally; no loss of blood; no bearing down; bowels all right; occasionally am troubled with passing water. I think I am doing very nicely." The other two have not replied. It will be seen that this is scarcely an ideal result, and since 1897 I have not seen a case in which I could recommend the operation as the best for that particular patient.

Dr. Heywood Smith writes that he considers enucleation *per vaginam* good in some cases when it can be done at one sitting, but says nothing of his results.

The older operation of supra-vaginal amputation with external fixation of the stump is still used by some operators. Mr. Rutherford Morison reserves it "for cases in which the patient is much weakened by hæmorrhage, when a bloodless rapid operation is necessary; or in cases complicated by pregnancy, as the increased vascular supply makes it the safer operation." But he gives, as objections to it, long convalescence and subsequent risk of ventral hernia. In a second letter he says: "I only know

one case treated extraperitoneally in which there is not a definite hernia of the cicatrix, though none of them have come back to me after I ordered a belt." Dr. Heywood Smith believes it to be "discarded by nearly all the best operators now, as tedious and not wholly without risk." I have only performed it once, in 1893. The tumor is shown in figure 13. Death two days afterwards. It appears to have been mainly justified as a tentative operation during the period before the perfection of other and more scientific methods. (See Chap. VIII.) Mr. Christopher Martin abandoned this—which he calls the clamp operation—definitely in 1895. Mr. Alban Doran¹ writes: "I have seen bad herniæ after the removal of fibroids by the old extraperitoneal or *serre-nœud* operation, done by skilful operators." (See also Professor Penrose, p. 298.)

But the results of all these operations are comparatively of little importance when compared with those of the three main present proceedings: **Supra-vaginal amputation**, with intraperitoneal or, more correctly, **subperitoneal treatment of the stump**; **vaginal hysterectomy**; and **pan-hysterectomy**.

Inasmuch as it is impossible to do anything like hysterectomy from the vagina without removing the entire organ, and as the question of removing the ovaries or not will in each case depend upon their freedom from disease, it is evident that this is as much pan-hysterectomy as though it were done from above, so that the three operations resolve themselves from this point of view into two—**partial hysterectomy**, leaving the cervix behind, and **total hysterectomy**, which removes the entire uterus, and which may be done from above or below, or by a combination of both routes.

Christopher Martin² has "never performed the operation of subperitoneal hysterectomy." He sends a list of 27 cases of pan-hysterectomy and 18 of vaginal hysterectomy.

"With regard to the after-results of both pan-hysterectomy and vaginal hysterectomy for myoma, in the great majority of the cases they are most satisfactory. The following are exceptions:

¹ Private letter.

² Private letter.

“ My first pan-hysterectomy (R. G.) suffered from intense dysmenorrhœa. The operation relieved her, but she is now suffering from chronic tuberculosis. The second case (M. A. B.) developed sarcoma of the femur about eighteen months after the operation, and died in 1897. Case 14 (E. L.) continued to have a discharge of fœtid pus *per vaginam* for many months after she left the hospital. When I last heard of her she was under the care of Dr. Eden, at the Chelsea Hospital, and I have now lost trace of her. Case 24 (S. H.) made an excellent recovery from the operation and returned home well ; she died suddenly, ten weeks after operation, from some brain mischief—probably embolism. Case 26 (E. P.) made a good recovery physically from the operation, but before she returned home developed symptoms of insanity. She had to be removed to an asylum in a state of acute mania. When I last heard of her she was still insane.

“ Referring, now, to the cases of vaginal hysterectomy for myoma, I know of only two cases where the after-progress has not been extremely satisfactory. Case 4 (E. E. A.) made a good recovery as regards the operation, but died early in the present year of apoplexy. Case 6 (F. C.), curiously enough, continues to have a sort of pseudo-menstruation. The loss is slight and without pain. I can only surmise that a small portion of one uterine cornu must have been left, and that from this the menstrual discharge proceeds.

“ With regard to the question of removal of one or both ovaries with the uterus, I cannot give you any precise information as to the effect in the various cases. I now always endeavour in doing hysterectomy to leave at least one ovary, unless both are obviously diseased or unless there are mechanical difficulties in the way. Sometimes there is not room to tie the upper ligatures on the uterine side of the ovaries, and then one is compelled *volens volens* to remove both.

“ With regard to the method of performing pan-hysterectomy, I follow that described in my paper¹—with slight modifications.

¹ See page 280.

I generally now begin from the vagina and separate the cervix, as far as is practicable, from the surrounding tissues. I then open the abdomen from above and complete the operation. With regard to ligatures, in most of my cases I have used silk. Latterly, however, I have been trying catgut with excellent results. In my earlier cases I used to draw the ligatures, left long, down into the vagina. But recently I have been in the habit of cutting all the ligatures, whether catgut or silk, short, and dropping them, as in ovariectomy. I always ligature, and have never clamped the broad ligaments."

Dr. Heywood Smith¹ says : "Subperitoneal hysterectomy—*i. e.*, cervix left as a stump and the peritoneum closed over it—is the ideal operation (specially urged by me some time ago). After this operation, future loss of blood is rare, pain is usually relieved, there is no vaginal discharge, no difficulties of micturition or defæcation. Hysterectomy leaving one or both ovaries *versus* removal of both is not yet sufficiently observed to be pronounced definitely upon. If an ovary is left, menstrual molimen occurs, with some perhaps painful sensations ; if both ovaries removed, some collateral trouble may supervene, as periodic headaches, and so-called hysterical symptoms, as a physiological expression of the body's rebellion against their abstraction. Vaginal hysterectomy has less mortality than abdominal, but that is most probably because the cases chosen for vaginal operation are the smaller tumors, and those therefore that naturally afford less probability of risk in their removal. I would prefer abdominal hysterectomy to vaginal morcellement of a large tumor, as being safer, more easily done, and should any complication arise, such is more easily and safely dealt with."

Mr. Rutherford Morison² prefers, when possible, supra-vaginal hysterectomy, with intraperitoneal treatment of the stump, and this, he says, "I do in all possible cases. Complete hysterectomy I reserve for cases in which the cervix is involved in the tumor, septic fibroids, fibroids of fundus complicated by cancer of the

¹ Private letter.

² Private letters.

cervix (of which I had one case),"—he is speaking of his cases during the last twelve months,—“cases in which, after extensive separation of adhesions, oozing from the surface is uncontrollable except by packing, which can then be brought out through the vagina. . . . I always leave one ovary when I can, but have never seen a reasonable woman complain for more than a few months after removal of both. . . . I have had no cases of insanity following operations for fibroids, but two of my abdominal hysterectomies with removal of both ovaries got very quickly fat after operation, and were nervous and depressed for about two years. . . . I am not satisfied that leaving one ovary is useful, as few fibroids ill enough to be operated upon seem to miss both.”

Professor J. M. Baldy,¹ of Philadelphia, writes: “The operation on which my answers are based is hysterectomy by amputation at the internal os, including complete removal of both Fallopian tubes and ovaries. The operation is performed through the abdominal incision; all wounds are closed up thoroughly with sutures and the stump dropped. No drainage is used.

“General health after operation: The general condition of the patient is that of a woman passing through the menopause—nothing more, nothing less. Otherwise they are perfectly well.

“The severity and variety of the symptoms of the menopause vary, as they do in women passing through that period in the natural way. I have *not* observed that the symptoms are more severe or more prolonged.

“No pain—unless there be special reasons for it, such as adhesions—or a nerve pain which existed prior to the operation and was simply unrelieved by that procedure.

“No discharge, if none existed prior to operation; even then it is generally cured in a few months. If a *vaginal* discharge existed prior to operation, it may remain, but the involution usually even cures that in a few months or a year.

“Never any discharge from retained cervix.

¹ Private letter.

"Absolutely never any bleeding.

"Prolapse or hernia very rarely. In doing my operations I gather the remnants of the broad ligaments up in such a way by my ligatures and sutures as to prevent this occurrence. I have never had to do a subsequent operation for such a result.

"Difficulties in urination or defæcation, none whatever."

Bland Sutton ¹ says that removal of the uterus from a mature woman, whilst it produces amenorrhœa and sterility, does not induce a complete menopause. In some cases, however, women of forty-eight and upwards, who had suffered from fibromyomata, with profuse menorrhagia, and from whom the uterus alone had been removed, began to complain, from eighteen months to two years afterwards, of flushing, and then passed through the usual disturbances characteristic of the normal menopause.

Sutton and Giles ² say : "Convalescence after supra-vaginal hysterectomy and pan-hysterectomy is as rapid and uneventful as after ovariectomy. The operation, which gives remarkable results, is being rapidly perfected."

Dr. Donald ³ says : "I am afraid it would involve rather more time and trouble than I can at present give to look up all my cases of operation for fibroid tumor. I am therefore unable to give you conclusions founded on a very careful analysis of my cases. There are many of the patients on whom I have operated whom I have never seen since their return home after the operation, and I doubt if I could find out where many of them are now living.

"I am glad, however, to give you my general opinions on the points which you mention in your letter, and I think that you may take these as fairly accurate.

"The general condition of the patient after an operation has been invariably good, except in cases in which oophorectomy has been performed for fibroid tumor ; in these latter cases the patient has often suffered for a period of longer than one year from symptoms produced by the involution of the tumor.

¹ Brit. Med. Journ., Lond., Oct. 14, 1899.

² Dis. of Women, 1897, p. 415.

³ Private letters.

"Pain has never been complained of twelve months after an operation.

"There has never been any vaginal discharge after twelve months, except in the cases of double oophorectomy.

"The above applies to losses of blood as well as to vaginal discharge.

"I have never noticed any tendency to prolapse or difficulty in urination or defæcation."

Mr. Bland Sutton ¹ writes : "I published a short series of cases of hysterectomy for fibroids in the Trans. Obstet. Soc., November, 1899. Since then I have performed a large number of hysterectomies with half the mortality of the first series.

"The remote results, especially where I have been able to preserve one ovary, have been excellent."

Dr. H. Macnaughton-Jones ² writes : "Great press of other work, and finishing the eighth edition of my book, prevent my answering your questions in detail, or trying to follow up the history of all my fibroid cases, which would be most difficult, as they were either done in my 'Home' or in private practice. I have been so far fortunate that I have only lost one case of abdominal hysterectomy for fibroid, and no vaginal. The particulars of this fatal case I intend yet to publish, but I may say that I believe it to have been due to the introduction of some septic infection in the course of the abdominal wound. The patient was reopened on the fourth day, and there was suppuration in the entire tract of the wound, with subjacent recent peritonitis with lymph effusion. On examining the pelvis there was nothing to be discovered, no accumulation in Douglas' pouch, no effusion, hæmorrhage, nor anything septic. In this case I have a suspicion that the peritonitis may have been originated by the use of needles which had not been re-sterilised after the suturing of the cervical stump, which had a large canal from which there had been discharge, and which possibly was not sufficiently disinfected beforehand.

"As regards the kind of operation or procedure, I am partial

¹ Private letters.

² Private letter.

to supra-vaginal hysterectomy, not necessarily performed as recommended by Howard Kelly, but modified according to the complications found at the operation, such as the height and position of the adnexa, any associated tumors in the broad ligaments, the extent of the bladder attachment, the depth of the pelvic portion, and adhesions. Of course, cases do occasionally occur in which the supra-vaginal operation has to be abandoned, and pan-hysterectomy substituted. This must depend upon the mode and direction of growth of the lower segments of the tumor, and the pelvic attachments; also upon interstitial changes in the substance of the tumor which may have invaded the cervix. I send you a plate of the largest fibroid I have ever removed by the vagina. (Fig. 47.) It was complicated with carcinoma of the cervix; the body of the uterus was the size of the fetal skull at term. The patient did well, and survived the operation over a year, dying subsequently of an attack of peritonitis. I should not again remove a tumor as large as this by the vaginal route, and I am inclined to think that with the exception of small fibromata, the abdominal is the best and the safest operation.

“With regard to oophorectomy, I have had some disappointing results, growth of the tumor and hæmorrhage continuing after removal of the ovaries; but on the whole I believe that in a growing fibroid in which hæmorrhage is the main symptom demanding operation, and occurring during the active period of ovulation, oophorectomy is indicated. I am aware that Continental opinion and that of many of our American *confrères* is against this view, but I have seen sufficient good results to warrant me in taking it.

“In my cases of hysterectomy I have had no instance of hernia. I consider it to be a most unlikely complication if the abdominal wall be carefully closed. I use triple sutures — fine silk for peritoneum, stronger for muscle and fascia, silkworm-gut for the skin. I regard as the most important point careful coadaptation of the edges of the fascia. Buried sutures have given me but little trouble, and stitch abscesses I have had but rarely. I have only known of one case of mental trouble arising after hysterectomy, and in this instance the patient had previously been in

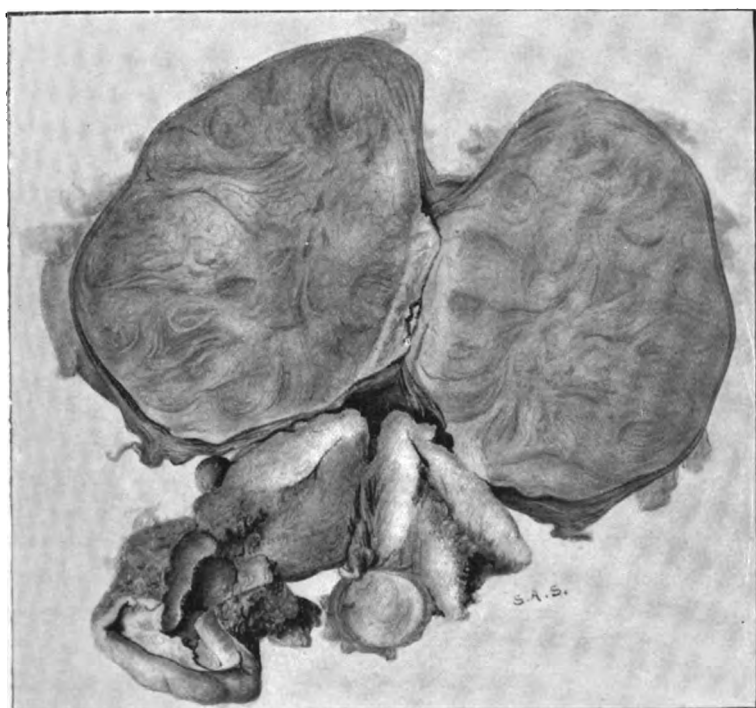


FIG. 47.—DR. H. MACNAUGHTON-JONES' CASE OF COMBINED FIBROMYOMA OF BODY OF THE UTERUS, WITH CARCINOMA OF THE CERVIX.

the asylum. All the patients whose after-histories I am cognisant of have been restored to good health, and there have been no post-operative complications worth speaking of. I have had no injury to the bladder, ureters, or rectum.

"May I thus sum up my present feelings on the subject of the operative treatment of fibromyomata :

"1. Whenever feasible, myomectomy must be the operation of selection.

"2. During active ovulation, when hæmorrhage is the principal symptom, oophorectomy should be performed.

"3. Vaginal hysterectomy should be limited to small tumors, if such be sufficiently troublesome to warrant operation, but in a number of such cases enucleation by colpotomy is sufficient as a radical step. Also in fibro-carcinomatous cases the vaginal route is preferable, unless the tumor be large and the carcinoma extensive, when either the combined operation or pan-hysterectomy offer the best chances of prolongation of life.

"4. When feasible, I believe supra-vaginal hysterectomy to be the safest for the woman, most rapid of execution, and less likely to be attended by post-operative shock. Removal of one or both ovaries will depend upon their condition.

"Lastly, I believe that on these grounds early operation in cases of uterine fibromata is indicated : (a) The chances of such constitutional conditions arising as anæmia, cardiac disease, renal complications, morbid mental states, and the general consequences which follow from pressure on the pelvic viscera, disturbance of the general circulation, and interference with the abdominal organs, as well as the patient's powers of locomotion. (b) The possibility of integral degenerations, necrosis, calcareous, carcinomatous, or sarcomatous. (c) The increased risk of operation resulting from extension of the fibromatous growth, as well as the increased size of the tumor and consequent gravity of the operation, all of which considerations raise its mortality and diminish the chances of the patient's recovery.

"I have said nothing of morcellement, as I regard this and section of the uterus as only adjunct steps in the operation of

vaginal hysterectomy, and indispensable for the speedy and safe performance of the operation in given cases."

Dr. Brown, of Baltimore, writes ¹ : " Dr. Kelly has asked me to answer your questions in regard to myoma uteri.

" Unfortunately the quantity of material is so great that it will be quite impossible to give definite answers to your queries, although we contemplate working up these points as soon as possible, which will, however, hardly occur within this present year.

" Speaking roughly, however, we have noticed that the general condition of the patient constantly improves after the operation, that recurrences are extremely rare, that the pain and vaginal discharge generally stop and do not recur, that there is no tendency to prolapse, and that difficulties in urination and defæcation, which were present before operation, are much improved."

Dr. Fred. Edge, of Wolverhampton, writes ² : " As regards pan-hysterectomy, I have not had any bad results. The vagina is shortened, and this interferes with connection very much in some cases.

" I suture in layers, and have had no hernia in these cases. I have not drained per abdominal incision in any myoma case, but had several ventral hernias where drainage was used in other cases.

" My after-results have been good or I have not heard of the bad points.

" The absence of colic and other pain from intestinal adhesions to stumps, etc., has often surprised me.

" Perhaps I might mention that I have had three cases where I advised noninterference, as there were no severe symptoms, and within three to five years they have returned to me with malignant degeneration of the growth."

Dr. Mary A. D. Scharlieb, ³ of the Women's Hospital, London, sends a list of fifty-two cases operated on up to October, 1899, with 4 deaths. Five were cases of oophorectomy, the last being performed in 1896 ; 3 abdominal myomectomies, the last in 1898,

¹ Private letter.

² Private letter.

³ Private letter.

no vaginal ; 5 vaginal hysterectomies ; the remainder, 39 in number, being abdominal hysterectomies, with subperitoneal treatment of the stump. The four deaths were all in this latter category. Three occurred within a few hours, one three days, after operation.

Of the 48 recoveries, one, an oophorectomy, is reported as "always weakly before and after operation ; one as much improved, also an oophorectomy ; one as having a sinus for a year, now healed—a subperitoneal hysterectomy ; 5 as good results, 17 as excellent. No pain, bleeding, hernia, or trouble of micturition or defecation in any. Twenty-three cases could not be traced.

Mrs. Scharlieb always, in abdominal hysterectomy, sterilises the cervical canal, then sews the muscular portions together, obliterating the canal, and subsequently sews over this stump the flaps of peritoneum which she has previously dissected from the anterior and posterior surfaces of the tumor ; thus the stump is treated subperitoneally.

The abdominal wound is always closed in three layers—*i. e.*, peritoneum, muscles, and skin.

In vaginal hysterectomy Mrs. Scharlieb always drains, the drain passing into the peritoneal cavity, for twenty-four or thirty-six hours, by means of a strip of iodoform gauze.

Dr. W. Gardner, of Montreal, writes ¹ : " I have had quite a large experience of operations for fibroids ; by the old method by the wire *écraseur* or clamp ; by the modern supra-vaginal amputation through the cervix, after ligature of the four great arterial trunks ; by total abdominal hysterectomy ; by total vaginal hysterectomy ; and by vaginal and abdominal myomectomy ; and, lastly, in a few cases by the removal of the appendages. I cannot tell you how many in all. Nor can I give you any statistics, and so definitely answer your queries I cannot. All I can give you is stray bits of information of cases seen or heard of at intervals after operation.

" In a general way, the results of operation have been most satisfactory. The patients have in most cases had the disagreeable

¹ Private letters.

symptoms attendant on the menopause, but they have not been worse than at the normal menopause. Colour has been regained in the hæmorrhagic cases and flesh has been gained. They have regained the capacity to be active. In some instances, by the old method of suture through all the layers and wire clamp method, I have had to deplore ventral herniæ ; but never in the cases treated by the intraperitoneal method of pedicle treatment, and triple layer suture.

“ In a very few cases there has been complaint of a little pain for a time—referred to one or other lower quadrant, and occasionally to the lumbar region.

“ In no case after three or four weeks has there been any vaginal discharge, save one, within my knowledge, in which there has been regular, moderate, and painless menstruation. In this last case the operation was done for hæmorrhage, and I suppose in doing the supra-vaginal amputation I must have left a piece of the endometrium of the body ; and as the left ovary remains, the function continues, but in a normal manner.

“ In some of the cases of vaginal hysterectomy, especially in parous women, there has been a troublesome tendency to prolapse. For this reason, unless contraindicated, I prefer abdominal supra-vaginal amputation ; the conservation of the cervix I think valuable as a safeguard against this ‘ sacropubic hernia.’

“ In a very few cases discomfort in micturition,—overfrequency observed never,—with slight pain ; these were chiefly cases of vaginal extirpation. I have no recollection of any difficulty in defæcation.”

Prof. C. B. Penrose, of the University of Pennsylvania, writes ¹ : “ I have your favor of January 19th in regard to the results of my experience in operating for fibroid tumors of the uterus. I will attempt to answer your questions in the order in which you give them.

“ The general condition of the patient has, as a rule, been much better after operation than before ; and the improvement has been

¹ Private letter.

more marked as every month passed by. In no case has a woman failed to show decided improvement at the end of two years over her condition before operation.

" Since giving up the use of the *nœud*, about nine years ago, my patients have experienced very little, if any, pain at any time after operation.

" A considerable number of women, after hysterectomy, seem to suffer for a number of months (and sometimes after several years) with an irritating vaginal discharge. This has occurred frequently in my practice and in the practice of my friends. This discharge in many cases is due to infection of non-absorbable ligatures placed in the stump of the cervix. As these ligatures sometimes require eighteen months or two years to be thrown off, the discharge may continue for this time. Again, the vaginal discharge is often due to a diseased condition of the cervix uteri, laceration, or cystic degeneration, etc., etc. And, finally, it seems to be due to a chronic inflammatory condition of the mucous membrane of the vagina, which sometimes follows hysterectomy, as also double oophorectomy, and is, I suppose, a change similar to that which occurs at the normal menopause.

" I have never seen any losses of blood after hysterectomy.

" No tendency to prolapse.

" No difficulties in urination or defæcation since giving up use of *nœud*."

On the other hand, Mr. Alban Doran writes¹: " There is at present a most profligate sacrifice of fibroids by operators, who admit that the disease is not fatal to life, and must be aware that in many cases where they operate the knife involves greater danger than medical treatment or no treatment. This danger often concerns life, but much more often threatens the patient's comfort, and the effects of removing the appendages or leaving an ovary have not been clearly determined.

" Recently, since I have adopted the retro-peritoneal method of amputation of the fibroid uterus, I have had 18 recoveries and 3

¹ Private letter.

deaths ; nearly all the cases were very severe. The patients are more comfortable during convalescence than when the serre-nœud is used. The use or non-use of saline solution for cleansing the peritoneum had more or less influence in my cases, which I intend to publish. I save an ovary, if possible, and *also* a piece of the tissue of the body of the uterus, so as to leave a little more than the cervix (Abel and Zweifel's principle, to prevent the atrophy of the ovary left behind).

"I admit that in a remarkable case of removal of a fibroid of the broad ligament weighing $4\frac{1}{2}$ pounds I used the serre-nœud as late as 1898, and left it on for reasons stated in the paper.¹ A broad ligament fibroid should be considered specially. It should be removed as soon as it is diagnosed. The uterus nearly always has to come away with it. Fortunately, this variety is rarely septic. By the principles I laid down in the paper in question I succeeded in saving my patient. The bleeding is *furious* if certain precautions be not taken.

"In three cases of this variety of fibroid, *since* this paper was published, I performed retro-peritoneal hysterectomy. A *large number of so-called 'uterine fibroids'* reported as though they began in the body or cervix belong to this class. They should be tabulated separately for surgical and clinical reasons. The operation for their removal is difficult, but the fear of sepsis slight. Retro-peritoneal hysterectomy for uterine fibroid may be easy, but there is relatively greater risk of sepsis.

"It is not easy to comment on other men's work, but from a number of cases, private and hospital, I know that operation is almost daily urged where the tumor is doing no harm whatever. The subperitoneal operation² seems altogether the most successful in after-results. When the flaps are closed in with a continuous suture, that suture not rarely comes away six months or more

¹ "Fibroid of the Broad Ligament Weighing $4\frac{1}{2}$ Pounds Removed by Enucleation ; Recovery." With table and analysis of thirty-nine cases. *Trans. Obstet. Soc.*, Vol. 41, p. 173.

² Or "retro-peritoneal operation." It cannot correctly be termed "intra-peritoneal." Doran.

after the operation. I know of cases; it occurred in one of my own, and the suture, 6 inches long, found its way, it seems, out of the *os*, after causing a little discharge for several months. I have not come across any bad results from pan-hysterectomy, but the operation is not very widely performed in Great Britain as yet.

"An abdominal hernia gives more discomfort than a tumor. Thus, a patient of a great operator taunted him when this result followed a simple *ovariotomy*, complaining, with truth, that she never suffered so much before the cyst was removed. Had it not been removed, she would have died. The same cannot be said in the case of removal of a fibroid which has caused no dangerous symptoms. I repaired a little while ago a very bad hernia in a woman who had undergone hysterectomy for a small fibroid on the urging of her doctor, and was worse off than before.

"The mixed ethico-scientific questions in respect to the treatment of fibroids make it very difficult to rely on statistics of expectant treatment or of operation.

"Certainly the innocence of fibroids has been exaggerated, but I think that it is quite unsurgical to operate upon a fibroid of moderate size which is causing no symptoms. I have watched a large number of such cases, and the tumors often remain stationary, causing no trouble of any kind. The patients are in better condition than if they were going about with an abdominal cicatrix and with ligatures and stumps in the abdominal cavity. In such a case the surgeon is not justified in urging the patient to undergo an operation; I regret to find that it is often done, and that even good operators sometimes lose a case which would, if let alone, have gone on favourably to the menopause. Operating is not always surgery, and success does not always prove that an operation was needed.

"Above all, mere menorrhagia is never an indication for operation, but constant uterine hæmorrhage demands it.

"I quite agree with you that the uterus should be removed when constant hæmorrhage, pressure symptoms, opening up of the broad ligament, or great bulkiness complicate the case. A patient with a fibroid should be warned and watched."

Cullingworth's final results after Baer's operation are 51 cases. Six cases have disappeared.

Of the 45 remaining, three were followed by ventral hernia. It is to be noted that in one case of these chronic bronchitis was present. In two, a small abscess formed, one being opened two weeks after operation in the left iliac region, after having produced symptoms of intestinal obstruction; one three years after, leaving a small sinus; whilst one case reported herself as in excellent health for three or four years, but then developed some hardness, apparently cellutitic, in the pelvis, since which time her health has deteriorated. Another case had a sinus for six months, which finally closed.

In one case in which the dominant symptom before operation had been undue frequency of micturition, this returned for a while six months after, but five years later the report was health excellent, except for some rheumatism and neuralgia.

In only one case were there periodic fits of depression five years after, and these were decreasing. In this case there was occasional pain and swelling of one hand. Curiously enough, in the only other case in which there was any mental disturbance, which took the form of some strangeness of manner, and curious antipathies, there was also functional paralysis of one arm.

In one case it is noted that the patient complains (ten months after) of some feeling of faintness during defæcation.

In all the rest, 40 cases, the results were excellent. "Life worth living since operation" (No. 21). "Remarkably well" (No. 14). "Cycles 10 or 12 miles easily" (No. 52), etc., etc.

As to my own experience of these operations, it may be said to be mainly confined to pan-hysterectomy, vaginal, abdominal, or combined; and chiefly the latter. Most of the cases I have seen have been already so large that extraction by the vagina alone was impossible, without great risk of bruising, or other injury to the tissues left behind. Figure 12 represents the largest I have submitted to this method. Pure vaginal hysterectomy has convinced me that the time devoted to division of the vaginal wall, ligation of uterine arteries, opening of Douglas' pouch, and sepa-

ration of the bladder, or, at least, a portion of it from below in the combined operation, is time well expended before the abdominal cavity is opened.

In all cases removal of the uterus with diseased tubes and ovaries—these are never removed if healthy—is followed by closure of the pelvic peritoneum, over a gauze drain drawn down from above into the vagina in abdominal, or introduced from below in vaginal, hysterectomy; the wound in the abdominal wall being then closed by tier suture without drainage.

My own mortality during the last four years, since the abandonment of peritoneal drainage, adoption of the combined method, and the use of celloidin, has been rather under 6 per cent.; before 1895, it was about 25 per cent. One case (Fig. 18) was a sloughing myoma, the main mass of which was broken down. During removal the thin outer coat gave way, and we could not be sure that some of the putrid material did not come in contact with the peritoneum. She was sixty-five years old and very collapsed before the operation was finished. There was a great deal of bleeding from the edges of the divided vaginal walls, and four or five forceps had to be left projecting through the lower end of the abdominal wound, besides some others in the vagina. She recovered, however, although a black slough extended at one time through from abdominal wall to vagina, and replied to my queries, January 28, 1900: "General health greatly improved. No pain, discharge, loss of blood, or bearing down. No fistula. Am a little troubled with constipation, though not painfully so; free passage of urine, slight difficulty at times in retaining it."

In my later series there have been two deaths—one from septic poisoning, as mentioned in chapter XI, when speaking of the use of celloidin; the other was produced in a curious way: The uterus having been removed, with some little difficulty, the patient showing signs of collapse, the ovary and tube on one side was examined and removed, but the other, being somewhat hidden by coils of small intestine, was not interfered with. She began to vomit the next day, but flatus passed during the night. The vomiting was never very great, but was persistent until her death on the fifth

day. Post mortem, a small dermoid cyst was found, in the position of the right ovary, attached by a narrow band to the appendix, and having for pedicle the right Fallopian tube. This small tumor had fallen into the true pelvis, which it nearly filled, and two or three collapsed coils of small intestine were found beneath, which had been compressed at several points by the pedicle and appendicial adhesion. There was primary union of both peritoneal wounds, and no trace of septic peritonitis.

Of the remaining number, I have answers from twelve. All but one report themselves as greatly improved; two as "greatly stronger than for years." One says: "She is just beginning to enjoy life again." One, however, writes (operation, September, 1898) that she has had a day or two lately in bed with pain in the left side, and is wondering if anything is wrong with the left ovary. This patient reports herself as improved, but not greatly; she has occasional bad headaches about once a month, and the bowels do not act without medicine. She has been lately without a servant, and has had to do the housework, to which she was not accustomed. This was a pan-hysterectomy by the combined method. All the rest report that they have had no pain, discharge, prolapse, hernia, or mental trouble. In one case, in a young woman, æt. 22, severe headaches developed during the first six months; these, however, were greatly relieved by ovarian tabloids, and I believe they gradually entirely left her. This case, however, is one of those who have disappeared. In that case, one ovary was left behind.

I have seen five cases of post-operative abdominal hernia, but only two after operations for fibroids. In all it followed the use of a drainage-tube or of drainage by gauze. In one case three operations were required to finally close this. The first was apparently successful; some months afterwards, when travelling by rail, she was indecently assaulted, and sprang from the carriage on to the platform to escape. The scar gave way, and a fresh hernia appeared. At the ensuing operation the fascia was found to have yielded in four places; omentum covered by parietal peritoneum had burrowed in several directions beneath the skin. Each small

hernia was excised and each opening closed. The weakened fascia again gave way, and fresh small herniæ were formed. At last, the whole weakened area was excised, the rigid edges of the rectus fascia freed, and whilst one side was cleaned below, the opposite side was freed above, and the two united by mattress sutures of silkworm-gut, which drew the former over, and fixed it upon the latter, after C. P. Noble's¹ method. The result appears to be permanent.

Since drainage through the abdominal wound has been entirely given up, and special care has been directed to the suture of the fascia, I have only seen one hernia, and that followed suppuration in the wound, due to an imperfectly asepticised suture. In cases of radical cure for inguinal hernia I have learnt to look upon suppuration as the one main cause of failure, after cough, which is the chief cause. It has invariably been followed by relapse.

Of vaginal hysterectomies I have had five. All were done by Landau's method, splitting the uterus, but with consecutive ligation, not clamping of the broad ligaments. In all, the pelvic peritoneum was closed as a final step. No prolapse of the vagina has occurred in any, nor has there been noted any urinary or rectal discomfort.

In reference to the alleged inducement of mental disorder by the operations, Hobbs'² observations of 220 women in the London Asylum, Ontario, mentally deranged, are of importance. He found distinct pelvic lesions in 188, sixteen of these being myomatous growths. This 220 were, however, only one-fourth of the cases in residence during the past five years, and were selected as possible cases of pelvic disease. The extirpation of the tumors, however, resulted in mental recovery of 30 per cent.; in improvement of 40 per cent. There was no improvement in 25 per cent., and one case died. Mental cure resulted more frequently when the lesion operated upon was of an inflammatory type, such as pyosalpinx, etc.

¹ Amer. Journ. Obstet., Vol. 41, p. 1, 1900.

² Amer. Journ. Obstet., Vol. 41, p. 1, 1900.

When patients of the poorer class, such as we meet with in hospital practice, are rendered, by any cause, incapable of pursuing their avocation in life, they sooner or later drift to workhouse infirmaries. A man suffers from a bad compound fracture of the leg ; amputation is required ; for some reason, either because of a fault in the performance of the operation itself, or because the tissues of his body are unhealthy, the wound does not heal ; fragments of bone continually exfoliate, and the patient is entirely incapacitated ; or cancer attacks a woman ; the first growth is removed in hospital ; it returns ; is again removed, but returns again. Such cases will often end in a workhouse infirmary. It seems but natural, then, if the evil results so strongly prophesied which should follow too ready a recourse to hysterectomy—fæcal fistula, ventral hernia, persistent incapacitating pain, mental disorder, etc.—really do occur to any extent, that we should hear of these victims from the medical superintendents of such institutions. A circular letter was therefore sent to a large number of workhouse infirmaries and incurable hospitals, etc., asking for details of any cases which might at any time have appeared in their wards. The replies are interesting ; and although not productive of any definite statistics, the negative evidence they supply is of value.

From the two large workhouse infirmaries connected with Manchester, W. P. Montgomery, M.D., writes : “There are no such cases in Crumpsall Workhouse, nor can I find reports of any.”

J. W. Smith, M.D., replies : “I have made enquiries, and find we have, at present, no cases in Withington who have been operated on for fibroids.”

From London the following reports have been obtained :

Holborn Union.—J. C. McLearn, M.D. : “I regret that I am unable to give you the information you ask for. I have not a case under observation, and in my case-book there is no case of this kind noted.”

Lambeth Infirmary.—M. H. Quarry, M.D. : “I regret that at present we have no cases in our wards of the class you mention, but if we receive any, I shall forward you the notes you desire.”

St. George's Union.—H. W. Webster, M.D. : “ I have looked through the patients in the infirmary, but I cannot find any who have been operated upon for uterine fibroids. I will, however, bear the matter in mind, and write you again if I admit any cases like those you mention.”

St. Giles. Cumberwell.—Thomas Gibson, M.D. : “ I regret to say that I have not been able to find any cases here which have been operated on for uterine fibroids. You see our infirmary here is mainly occupied with acute cases, and we are not so likely to come across the cases you want as we would in one containing beds for chronic cases ; however, I will keep your letter in mind, and will send you notes of any cases that may turn up. I shall only be too pleased to help you.”

Poplar and Stepney.—C. Spuerell, M.D. : “ It is very natural that you should apply to an institution such as mine for the information you require, and you will no doubt be surprised to hear that during my whole tenure of office (five years) I have not come across a single case which has undergone any of the operations you mention. Regretting that I am unable to oblige you,” etc.

Whitechapel Infirmary.—Herbert Larder, M.D. : “ I regret very much I am unable to send you any information of any value in connection with your letter on the subject of uterine fibroids. Although we have over 6000 admissions during the year, we rarely see any such cases as you mention. I think it must be that the hospital surgeons arrange for the patients to attend as out-patients so as to keep them under observation.”

Shoreditch Infirmary.—Everitt E. Norton, M.D. : “ I regret that I can give no such information as you are seeking. In these institutions we have but little time for note-taking. One finds, moreover, very few, probably far fewer than you would imagine, of the class of patients you mention, and in the cases we do find there is such remarkable difficulty in finding out, from the patient's account, what operation, if any, has been done, that without making a routine examination of large numbers of patients (a thing not practicable), we often miss cases in which such

operations as you name have been done earlier in life. In this infirmary we deal very largely with senile patients."

St. Pancras.—J. Smedley Boden, M.D.: "I regret not to be able to give you any notes of the class of cases you ask for. During my three years here as Senior Assistant only two of the cases you enquire about came under my notice in my 120 female beds. In both, on opening the abdomen no further steps had been found expedient. One came in with a fæcal fistula, and in the other the mass underwent considerable shrinkage during the two months for which she remained an inmate; this possibly may have been due to the mere opening of abdomen, followed, as it was, by a period of nearly two months' rest and regular living. In 1898 I myself did an abdominal hysterectomy, treating the pedicle extraperitoneally for fibroid in a charwoman. Three months later I heard she had got a situation from the convalescent home to which I sent her; since that time I have lost sight of her."

Central London Sick Asylum.—Jno. Hopkins, M.D.: "I would be glad to give you the information you ask for, but I really have had no cases that have been operated on for fibroids. This negative evidence may perhaps be of value."

St. Saviour's Union, Surrey.—J. S. Richards, M.D.: "In answer to your enquiry, I have to state that at present there are no cases of myomata of uterus that had been operated on elsewhere in the infirmary. I further regret that I have no statistics as to previous cases to submit."

Lewisham.—F. S. Toogood, M.D.: "In reply to yours, I am sorry to say I am not in possession of the statistics you require, but will retain your letter so that should I at any time come across any, I will forward them to your address."

Hampstead Workhouse Infirmary.—E. Claude Taylor, M.D.: "I have not at present any cases of the kind you enquire about; but should I be able to send you any facts of importance when such a case may turn up, I shall be pleased to do so."

Longmore Hospital for Incurables, Edinburgh.—R. H. Blaikie, M.D.: "There have been no cases of uterine fibroids which have

been operated upon in the Longmore since Lundie and I were appointed. I have not had time to search the case-books yet, but Miss Beveridge tells me she can only remember one case (possibly two) of the kind since she came to the hospital."

Aberdeen Hospital for Incurables.—G. Maitland Edmond, M.D. : "There are no cases such as you refer to in the Aberdeen Hospital for Incurables at present."

Leicester Union Workhouse.—C. F. Bryan, M.D. : "I regret that I cannot give you any statistics as regards fibroids, as I have not kept any notes, and I hardly ever have any such cases there."

St. Mary Abbott's, Kensington.—H. Percy Potter, M.D. : "The cases of this nature sent in to me have frequently been under observation and treatment at general hospitals, or else much neglected and treatment unduly deferred by the patients themselves. Then, again, many women of the lower orders are difficult to be persuaded that an operation will benefit them. If the enclosed notes are of any service, pray make whatever use you like of them." These are notes of four cases :

1. E. W., 40, single. Large fibroid 2 years, subperitoneal hysterectomy, many adhesions. Death within one hour in spite of transfusion, brandy, strychnine, etc.

2. A. K., 44. Removal of intra-uterine polypus. Cure.

3. E. B., 45. Subperitoneal hysterectomy. Tumor 1½ lbs., uneventful recovery. Patient seen 4 months later ; good result.

4. E. H., 63. Sloughing myoma, sponge tent removed said to have been introduced 10–12 years ago. Temperature intermittent from admission to death, 99°–102°. Death without operation. P. M.—Large fibroid generally involving uterus—towards uterine cavity extensively broken down and decomposed. No peritonitis, no adhesions, ovaries and all organs healthy. ("Would have been a good case for hysterectomy, if her general health had permitted operation.")

Liverpool Workhouse Infirmary.—W. Alexander, M.D. : "Patients with complications after hysterectomy as the cause of admission are practically unknown at the Liverpool Workhouse. They always return to the hospital or surgeon where and by whom they were operated upon ; and the only cases at the Workhouse, as a rule, are my own. I have notes of thousands of

workhouse cases, but I am sorry to say a search among them for results of hysterectomies would be useless, so few would be found and so great the labor and uncertainty. I sympathise with you in your endeavor, but the result you aim at could only be attained by each man following up as far as possible his own cases, and this in a large city is very difficult."

Semon Convalescent Home, Ilkley. Spa and Ben Rhydding Hydropathic Establishments.—Thos. Johnstone, M.D.: "I am afraid I cannot furnish you with detailed information to your queries. My experience is: given recovery from the operation, the nature of the operation has much less to do with the permanent result than the time at which it took place. What I mean is, a patient who has passed through a series of years without operation, and who has taken on the habits of a chronic invalid, and probably become neurasthenic, will never make such a good result as in a case operated on early, before such habits were established—and that independent of the nature of the operation performed."

Yorkshire Home for Incurables, Harrogate.—E. Solly, M.D.: "I regret I have not had any case of the kind you referred to under my care in the Yorkshire Home for Incurables or in private during recent years. I will write again with pleasure should I come across any of interest on the lines you lay down."

St. Barnabas' Home for Incurables, Torquay.—W. Wilking Stabb, M.D.: "In answer to your enquiry of February 17th, I regret to say that St. Barnabas' Home has afforded me *no* material that would admit your investigations, as I have not had there (strange to say) a single case of uterine fibroid that has been treated by operation."

Northern Counties Hospital for Incurables, Mauldeth Hall.—J. W. Ashworth, M.D., Lond.: "In answer to your enquiry as to cases of uterine fibroids, I find that two cases only have found their way into the Northern Counties Hospital for Incurables at Mauldeth, Heaton Mersey, and that neither of these have ever had an operation performed."

I have included all the replies, without exception, which have reached me up to this time.

Perusal of these replies suggests very forcibly two main points :

First, the failure to discover any number of evil results following hysterectomy does not arise from a want of desire to assist on the part of the writers. Each one, on the contrary, is most ready and courteous.

And the second thing is the remarkable unanimity of non-result—a want of facts to substantiate the frequently expressed common belief that has surprised even some of those who are writing, and who had not had the opportunity of seeing other replies. How is this to be explained? Dr. Alexander, whose opinions on these points are of great value, thinks that these cases always return to the surgeon who has operated; but is this the usual experience in other operations followed by bad results? My experience and that of all other surgeons to whom I have mentioned this point is the very reverse; but granting this for a moment, patients are not retained in general hospitals indefinitely. A woman with an incurable fistula would be discharged at the end of a specified time. She would, no doubt, be told to return. If she had any money or friends, she might do so; but if none, and was thereby incapacitated, she would almost certainly, sooner or later, come on the parish, as it is called, and be sent to the work-house infirmary. How is it she is never seen?

It may be impossible, as one correspondent says, to make a routine examination of large numbers of patients, but that is not at all required. If it were true that hysterectomy was followed in any perceptible number of instances by fæcal fistula, large ventral hernia, vaginal prolapse, persistent incapacitating pain, or mental disturbances, these conditions would be forced upon the notice of the medical superintendents of these institutions; they would not need to be searched for, and no operating surgeon needs to be told that if a patient imagines that her sufferings date from any proceeding on his part, she and her friends will not be inclined to be reticent about it, but rather the reverse. And these returns do not come from one part of the country alone. They represent its whole extent; and, however explained, all agree in the one thing: "There are no cases of the kind here." It will be noted that, of

the two cases of evidence, the latter, contrary to expectation, is the most reassuring.

Are we not justified in believing that the true reason for the absence of such reports of cases is that they do not occur, at least to anything like the extent predicted? that the dread of such results is, after all, unwarranted by facts? and that uterine fibroids may safely, therefore, be removed before the severer incidents of their presence arise to complicate matters, and immensely to increase the risk?

With the evidence thus accumulated, some reply may be attempted to the questions formulated:

First, with the later operations, pan-hysterectomy, subperitoneal and vaginal hysterectomy, the general health should, unless there is concurrent disease of other organs, become perfectly restored.

Second, if oophorectomy, myomectomy, or ligature of arteries is done, the good effect may take months to obtain, it may be absent or imperfect, and it cannot be relied upon as permanent. If hysterectomy by any of the later methods, the general health will begin to improve at once, and the improvement may be reckoned upon as progressive and lasting.

Third, if one of the later operations is properly and thoroughly carried out, there will be no after-pain, vaginal discharge, bleeding, prolapse, hernia, faecal fistula or persistent sinus, difficulties as to defaecation or micturition after twelve months. If mental trouble occurs, it does so in no greater proportion after these operations than after any other surgical interference. Mental alienation is, indeed, sometimes removed by them.

Fourth, the retention of the uterus, once the ovaries are removed, has not proved to be of any advantage, but rather the reverse.

Fifth, after twelve months the patients who have had the uterus and tumor removed will be in a far better condition than those who retain their uterus but have lost the appendages.

Sixth, a patient who has had supra-vaginal amputation with extraperitoneal fixation will, in twelve months' time, be almost certain to have ventral hernia. She will also in all probability have some disturbance as to the urinary function, either undue

frequency in micturition, inability to retain a normal amount of urine, or difficulty in expelling it. She is also very likely to have a persistent supra-pubic sinus. None of these disabilities follow the later operations. Subperitoneal hysterectomy, however, may have for several months purulent discharge from the retained cervical stump, either from the sutures employed, or from the internal mucous surface of the cervix.

After pan-hysterectomy, if one or both ovaries are left, when once the patient has recovered from the immediate dangers of the operation, there is no likelihood of any evil after-effects. During the first year, or possibly two, some of the symptoms of the menopause may show themselves.

After pan-hysterectomy or vaginal hysterectomy, when properly performed,—*i.e.*, after closure of the pelvic peritoneum, and thereby approximation of the broad ligaments,—vaginal prolapse does not occur; the excessive bleeding at once ceases, but anæmia persists for a longer or shorter interval. It usually finally disappears. Of vicarious menstruation I can find no record. One or two cases of apoplexy have been recorded. In some cases, for the first year there has been slight vaginal loss at each period, resembling menstruation. This is usually attributed to the remains of some portion of the uterus, but we have no absolute evidence as to the fact of this.

In conclusion, it may, I think, be accepted as proved that fibromyomata, although scientifically styled benign, in contrast to malignant growths, such as carcinoma, are by no means harmless, but expose the patient to great and increasing risk—risk of life, frequently, partly due to their own inherent conditions, partly to the changes produced in them as time elapses, whilst in those cases in which life is not directly threatened, they deprive the patient of those years of her existence in which her powers of enjoyment and usefulness should be greatest; that in certain well-defined cases electrical treatment by mild currents is extremely useful, but that the only certain remedy is by surgical interference; that delay in resorting to this unnecessarily imports into the case its most dangerous complications, such as necrosis, pyosalpinx, hydro-

nephrosis, adhesions, cardiac troubles, whilst it immensely and unnecessarily increases the dangers attending operation; that, under present conditions, and with the knowledge and technique available at the present day, the risks of such interference are not greater, but less, than those incurred by the woman who suffers from such a tumor which is increasing in size, or which is producing symptoms due to pressure or loss of blood; and that by resorting to one or other of the later perfected operations, surgeons have it in their power to restore these patients once more to safety, and happy and useful life. It is, however, obvious that they cannot remove those secondary conditions, cardiac and renal complications, which waiting for the elusive menopause has added to the original disease. A patient once attacked by these, whilst operation will probably be the best, if not the only way of preventing increase of such mischief, will, in all likelihood, always remain more or less an invalid.

So much has been said in the past as to the responsibility under which any one labours who advises resort to such operations as that of hysterectomy, that there is a danger that we may forget the far greater responsibility which rests upon those who counsel delay, until an operation which earlier might have been a simple and safe affair, has become in consequence of their advice a most dangerous and risky proceeding, only to be undertaken, indeed, as the only other alternative to certain death or constant misery.

In addition, to prevent possible misconception, it must be repeated that cases which produce no symptoms, which are not obviously enlarging, or in which there is but little hæmorrhage or signs of interference with important functions, are best let alone.

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EXTRACT FROM THE PREFACE

This work has been under consideration for the past fifteen years, and much of it has been several times rewritten. An effort has been made to make it a comprehensive work upon the subject, giving the experience and methods of the most careful men, while my own experience has been utilized to indicate that which I have found most useful and worthy of acceptance.

Each general subject is considered with reference to its influence upon the entire genital tract, and the work is divided into sections rather than chapters. This course, although a departure from the ordinary text-book arrangement, is that which experience has demonstrated to be most effective in impressing the subject upon the student, and would seem to me preferable to him who uses the book to refresh his knowledge upon some particular subject. The illustrations are arranged solely with the purpose of rendering clear the text and to promote the work of diagnosis and treatment. For the excellence and character of the illustrations I am greatly indebted to the generosity of the publishers and to the skill and patience of their artists, Messrs. Shannon and Von du Lancken. To the kindly oversight of Dr. Robert L. Dickinson is due much of the exactness of the drawings. Acknowledgment is due Miss Eleanor A. Cantner for her ability in the preparation of preliminary sketches and of the index.

Should it be the means of lightening the work of the student, of making more clear the pathway of the busy practitioner, and, most of all, of benefiting suffering women through improved methods of diagnosis and treatment, I shall feel well repaid for the many days and nights of labor which it has cost.

G.

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